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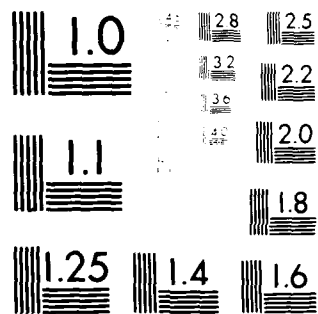
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20. ABSTRACT (Continued on reverse side if necessary and identify by block number) This report provides information and analysis on the physical condition of the dam as of the report date. Information and analysis are based on visual inspection of the dam by the performing organization. Examination of the available documents and visual in- spection of the Greenhaven Correction Facility Dam did not reveal conditions which constitute a hazard to human life or property.		

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the concrete gravity dam would be overtopped for all storms exceeding approximately 38.8 percent of the Probable Maximum Flood (PMF). Although the spillway capacity is inadequate from a hydraulic and hydrologic point of view, the hydraulic inadequacy will not affect the stability of the concrete dam section during overtopping nor the safety of the dam since it is supported on sound rock and overtopping will cause neither significant erosion at the toe or abutment nor undermine the foundation. In addition the dam stability is considered to be adequate against overturning and sliding.

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LOWER HUDSON RIVER BASIN

GREENHAVEN CORRECTION FACILITY DAM

**DUTCHESS COUNTY, NEW YORK
INVENTORY NO. N.Y. 1170**

**PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM**



NEW YORK DISTRICT CORPS OF ENGINEERS

SEPTEMBER 1981

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D. C., 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I INSPECTION REPORT
 NATIONAL DAM SAFETY PROGRAM
 GREENHAVEN CORRECTION FACILITY DAM
 I.D. NO. N.Y. 1170
 D.E.C. NO. 230C-4123
 LOWER HUDSON RIVER BASIN
 DUTCHESS COUNTY, N.Y.

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PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

NAME OF DAM: Greenhaven Correction Facility Dam
(I.D. No. N.Y. 01170)

STATE LOCATED: New York

COUNTY LOCATED: Dutchess

STREAM: Gardner Hollow Brook

BASIN: Hudson River

DATE OF INSPECTION: July 8, 1981

ASSESSMENT

Examination of the available documents and visual inspection of the Greenhaven Correction Facility Dam did not reveal conditions which constitute a hazard to human life or property.

Using the Corps of Engineers screening criteria for review of spillway adequacy, it has been determined that the concrete gravity dam would be overtopped for all storms exceeding approximately 38.8 percent of the Probable Maximum Flood (PMF). Although the spillway capacity is inadequate from a hydraulic and hydrologic point of view, the hydraulic inadequacy will not affect the stability of the concrete dam section during overtopping nor the safety of the dam since it is supported on sound rock and overtopping will cause neither significant erosion at the toe or abutment nor undermine the foundation. In addition the dam stability is considered to be adequate against overturning and sliding.

However, the dam has a number of problem areas which require further attention. The following remedial and maintenance actions should be completed within one year.

- Removal of trash and debris from spillway channel
- Repair reservoir drain control works
- Remove vegetation from spillway crest and chute
- Repair cracked and deteriorating concrete on abutment spillway chute
- Backfill spillway chute wall and protect slope against erosion

- Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain. Document this information for future references. Also develop an emergency action plan.

Eugene O'Brien

Eugene O'Brien, P.E.
New York No. 29823

Approved:

for *William E. May Jr.*
Col. W.M. Smith, Jr.
New York District Engineer

Date:

10 SEP 1981



1) OVERVIEW OF DAM

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
GREENHAVEN CORRECTION FACILITY DAM
I.D. NO. N.Y. 1170
D.E.C. NO. 230C-4123
LOWER HUDSON RIVER BASIN
DUTCHESS COUNTY, N.Y.

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

a. Authority

The Phase I inspection reported herein was authorized by the Department of the Army, New York District, Corps of Engineers Contract No. 51-81-C-0008 Modification P00001 in fulfillment of the requirements of the National Dam Inspection Act, Public Law 92-367 dated 8 August 1972.

b. Purpose of Inspection

This inspection was conducted to evaluate the existing condition of the dam, to identify deficiencies and hazardous conditions, to determine if these deficiencies constitute hazards to life and property, and to recommend remedial measures where required.

1.2 DESCRIPTION OF PROJECT

a. Description of the Dam and Appurtenant Structures

Greenhaven Correction Facility Dam is a 176-foot long concrete gravity structure having a maximum crest height 38 feet at center and a 6-foot crest width. The dam (according to design drawings) is keyed into the foundation at the heel by a shear cut off wall extending between 5 and 15 feet into underlying bedrock. The upstream face of the structure is vertical whereas the downstream face slopes at 1.75V:1H entering into a curvilinear section forming the spillway apron near the base of the dam. Small piers are located at the crest to support a walkway spanning the spillway section (See photographs 2 and 3).

The service spillway (See photographs 1 and 3) is a central overflow section of the dam, 100 feet in width. The crest of the spillway is bi-level with a 50-foot long low level section having an invert of El.520 and the remaining 50-foot section having an invert of El.520.5. Discharge over the low level portion of the spillway flows down the face of the dam exiting on a curvilinear apron at the toe whereas overflow at the higher level portion of the spillway is directed to a chute descending from the right abutment to the brook located along the downstream face of the dam.

The dam is equipped with a 36-inch cast iron "Blowoff Line" reservoir drainage system passing through the dam near the left abutment. Flow through the drain is controlled by a gate valve operated from a gatehouse located near the left abutment on the crest of the dam.

b. Location

The dam is located approximately one-half mile north east of Poughquag, Dutchess County, New York.

c. Size Classification

The dam is 38 feet high and has a reservoir at this height with a storage capacity of 322 acre-feet and, therefore, is classified as a small dam.

d. Hazard Classification

The dam is in the "high" hazard potential category due to the location of occupied residences located downstream and within the flood plain.

e. Ownership

The dam is owned and operated by the New York State Department of Corrections, Greenhaven Correction Facility, Stormville, N.Y. 12582, telephone no. (914) 221-2711. Prime contact at the facility is Mr. Angelo Lonardo, Plant Superintendent.

f. Purpose

The dam was constructed to form a water supply reservoir for the Greenhaven Correction Facility.

g. Design and Construction History

The dam was designed and constructed by the State of New York, Department of Public Works circa 1939. Construction of the dam appears to be in general accordance with the original design.

h. Normal Operation Procedure

Discharge is uncontrolled through the service spillway. There appears to be no normal operating procedure established for the reservoir drain.

1.3 PERTINENT DATA

a. <u>Drainage Area</u> , Square miles	4.45
b. <u>Discharge at Dam Site</u> , cfs	
Uncontrolled Service Spillway	
at Maxi. Pool	3324 cfs

Reservoir Drain at Maxi. Pool (El.525.25)	Unknown
Total Discharge at Maxi. Pool (El.525.25)	3324 + cfs
c. <u>Elevation</u> , USGS Datum MSL	
Crest of Dam	525.25*
Maximum Design Pool	Unknown
Spillway Crest (low level/high level)	520.0/520.5*
Invert Reservoir Drain-Upstream	492.0*
d. <u>Reservoir</u>	
Length of Maximum Pool, feet	1900
Surface Area @ Max. Pool, Acres	23.5
e. <u>Storage</u>	
Normal Pool	240 acre feet
Maximum Pool	322 acre feet
f. <u>Dam</u>	
Type	Concrete Gravity
Height, feet	38*
Length, feet	176*
Upstream Slope	Vertical
Downstream Slope	1.75V:1H
Crest Elevation, feet	525.25*
Crest Width, feet	6*
Cut off Type	Partially Reinforced concrete wall
Grout Curtain	None
g. <u>Spillway</u>	
Type	Bi-Level slot in central portion of dam
Crest Elevation, feet (low level/high level)	520.0/520.5*
Width, feet	100*
Flow Regulation	Uncontrolled
h. <u>Reservoir Drain</u>	
Type	C.I. Pipe
Dimensions	36" I.D.
Flow Regulations	Sliding Gate Valve

*Based on original design drawings

SECTION 2 - ENGINEERING DATA

2.1 GEOLOGY

The Greenhaven Correction Facility Dam is located in the Hudson Highlands Section of the New England Maritime Physiographic Province. The bedrock in the area consists of metamorphic, igneous and sedimentary rocks which have undergone a complex sequence of position, folding, faulting and erosion. In the vicinity of the damsite, bedrock consists of thinly bedded shales and limestones.

2.2 SUBSURFACE INVESTIGATIONS

There is no record of subsurface investigations for the dam. Shallow surficial soils along the dam alignment are presumed to be alluvial deposits associated with the Gardner Hollow Brook, whereas underlying soils projected as being of glacial origin.

2.3 Dam and Appurtenant Structures

The original design drawings for the Greenhaven Correction Facility Dam were reviewed on site. File copies were not available. Photographic reproductions of pertinent plans and portions of plates from the original designs drawings are presented in Appendix A.

2.4 CONSTRUCTION RECORDS

No information regarding the construction of the dam and its appurtenant structures is available. The dam was reportedly built circa 1940. Resurfacing of the abutment spillway chute has been performed.

2.5 OPERATING RECORDS

No systematic monitoring of the dam's performance is in effect at this time.

2.6 EVALUATION OF DATA

The information obtained from the available documents and visual inspection are sufficient to support a Phase I evaluation of the dam.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

a. General

The visual inspection of Greenhaven Correction Facility Dam was made on July 8, 1981. The skies were clear with temperature ranging from 85° to 95°F. The reservoir level was estimated to be at El. 520.1 based on a water depth of about 1-inch flowing over the low level section at the spillway crest.

b. Dam

The overall structural stability of the dam is good with only minor spalling of the walkway piers being observed. The vertical and horizontal alignments of the dam exhibit no signs of noticeable movements.

c. Spillway

The spillway appears in good structural condition, with the exception of the upper level chute, located at the right abutment. This chute exhibits surface cracking and severe deterioration of a gunite surface layer near the base. Vegetation has become well established on both the spillway crest and on the abutment spillway chute. Minor erosion along the downstream wingwall was also observed. Minor seepage at the abutment spillway chute/dam contact was observed.

d. Appurtenant Structures

The gatehouse is unsecured. Reportedly as a result of vandalism the door is missing, as are the control mechanisms to operate the reservoir drain (See photograph 8).

e. Downstream Channel

Both the spillway and reservoir drain discharge directly into Gardner Hollow Brook immediately downstream of the dam (See photograph 9). Moderate amounts of trash and debris are present in the Brook immediately downstream of the dam.

f. Abutment

The dam abutment areas are in good condition. There does not appear to be either instability or seepage problems in these areas.

g. Reservoir Area

No slides or general instability were observed along the reservoir shorelines in the general vicinity of the dam. No significant sedimentation was observed along the dam.

3.2 EVALUATION OF OBSERVATIONS

Although deficiencies were observed, there is no indication that the dam is in imminent danger. Some of the deficiencies noted previously are minor and should be corrected in conjunction with routine maintenance. Other conditions described, however, represent conditions which may present potential for further deterioration and consequently need for further investigation and correction.

The following is a summary of the problem areas encountered and recommended corrective measures requiring immediate attention:

- 1) Replace reservoir drain control gears.
- 2) Repair major cracks and damaged concrete on spillway chute located at the right abutment.
- 3) The gatehouse should be properly secured to deter or prevent further vandalism of control mechanism.
- 4) A program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and maintenance of the reservoir drain and its control facilities should be developed and implemented. Inspection should be documented for future reference. Also, an emergency action plan should be developed.

SECTION 4 - OPERATION AND MAINTENANCE PROCEDURES

4.1 PROCEDURES

No written operation and maintenance procedures exist for the project. The normal operation is to allow flow over the service spillway.

4.2 MAINTENANCE OF DAM

It is reported that no routine maintenance of the dam is performed.

4.3 WARNING SYSTEM IN EFFECT

No warning system is in effect or in preparation.

4.4 EVALUATION

The overall operation and maintenance of the Greenhaven Correction Facility Dam is considered inadequate as a result of the following conditions:

1. Inoperable reservoir drain valve (missing controls).
2. Vegetation growth on the spillway crest and spillway chute.
3. Absence of a written operation and maintenance procedure.
4. Absence of any written maintenance history.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 DRAINAGE AREA CHARACTERISTICS

The Greenhaven Correctional Facility Dam is located on the Gardner Hollow Brook, Beekman township, Dutchess County, New York (HUC No. 02020008). The drainage area contributing to the reservoir is 4.45 square miles. It is rectangular in shape with wooded slopes varying in steepness from a maximum of about 26% to a 4% average channel slope (700 ft. in 17,000 ft.). There is relatively little storage within the basin and the reservoir occupies 14.7 acres or 0.5 percent of this area. There is very little development within the drainage basin.

5.2 ANALYSIS CRITERIA

The adequacy of the spillway was analyzed under the Probable Maximum Flood (PMF) in accordance with the Recommended Guidelines for Safety Inspection of Dams (Ref. 3). An inflow hydrograph for the Probable Maximum Precipitation (PMP), was developed using the Snyder method and the U.S. Corps of Engineers HEC-1DB computer program. The all season 200 square mile 24 hour PMP of 21.5 inches was obtained from HMR #33. The precipitation distribution was computed by the standard EM-1110-2-1411 method. Rainfall losses of 1.0 inch initial loss, and 0.1 inch per hour constant loss selected for the PMF event. The average Snyder coefficient's of $C_T=2$ and $640 C_p=400$ were selected for the basin. T_{pr} were computed to be 2.94 hours.

5.3 SPILLWAY CAPACITY

The spillway is an overflow section of the concrete gravity dam acting as an ogee weir having a hydraulic width of 90 feet and a length of 6 feet. The capacity of the spillway with the water surface at EL.525.25 (top of dam) is 3324 cfs.

5.4 RESERVOIR CAPACITY

The reservoir capacities at the spillway crest (EL.520) and the top of the dam (EL.525.25) are 240 acre-feet and 322 acre-feet, respectively. The computed surcharge storage of 82 acre-feet is equivalent to 0.34 inches of runoff over the entire drainage area.

5.5 FLOODS OF RECORD

There are no records of floods or maximum lake elevations.

5.6 OVERTOPPING POTENTIAL

The potential of the dams being overtopped was investigated on the basis of the spillway discharge capacity and the available surcharge storage to meet the selected design flood inflows.

The HEC-1DB analysis was performed assuming that the water surface of the reservoir was at spillway crest elevation (520.MSL) at the start of the flood event.

The results of the multi-ratio analysis are as follows:

<u>RATIO OF PMF</u>	<u>PEAK INFLOW (cfs)</u>	<u>PEAK OUTFLOW (cfs)</u>	<u>OVERTOPPING (feet)</u>
1.00	8601	8570	2.62
0.75	6451	6414	1.68
0.50	4301	4271	0.60
0.25	2150	2131	0.0

The maximum spillway discharge capacity is 38.8 percent of the PMF peak outflow.

5.7 EVALUATION

The spillway is unable to pass either the PMF or one half PMF without the dam being overtopped. The inability of the spillway to pass a 1/2 PMF event will not affect the safety of the concrete dam. Since it is founded and keyed into sound bedrock at both the foundation and abutment areas. Overtopping will cause neither significant erosion at the toe or abutment, nor undermine the foundation of the dam. Therefore, the spillway is judged as being inadequate.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

a. Visual Observations

Visual observations did not reveal any conditions which at present adversely affect the structural stability of the dam.

b. Design and Construction Drawings

Original design drawings conform to the structure as it stands today. No construction drawings or record of construction are available.

c. Operating Records

There are no operating records for the dam.

d. Post-Construction Changes

There are no reported major post-construction changes to the dam. Some repair work to patch-up cracks and deteriorating concrete in the abutment spillway chute has been performed.

e. Seismic Stability

The dam is located in Seismic Zone 1 and in accordance with recommended Phase I guidelines. However, based on the past earthquake activity in the area, the New York State Geological Survey considers the area to be more characteristics of a Zone 2 setting. Based on this assessment the dam is considered in the Seismic Zone 2.

6.2 STRUCTURAL STABILITY ANALYSES

Structural stability analyses were performed to evaluate both sliding and overturning potential of the maximum overflow section with respect to five critical loading conditions.

Analyses were performed with results being assessed in accordance with procedures recommended by the U.S. Army Corps of Engineers (Ref. 1). Results of the analyses are summarized as follows:

<u>Case</u>	<u>Loading Condition</u>	<u>Location of Resultant</u>	<u>Sliding F.S.</u>
I.	Normal loading condition, reservoir level at spillway crest, no ice load	Within middle third	8.50
II.	Normal loading condition reservoir level at spillway crest, no ice load	1.46 feet outside middle third	4.81

III.	Unusual loading: flood level equal to 1/2 PMF at maximum section	3.83 feet outside middle third	3.18
IV.	Extreme loading: flood level equal to PMF at the maximum section	5.50 feet outside middle third	3.02
V.	Unusual loading: reservoir level at spillway crest, and earthquake forces	Within base	4.67

The results of the stability analysis based on resultant force locations indicate that stability of the dam against overturning is inadequate for all loading conditions except for Cases I & V.

Sliding stability of all cases, however, is acceptable in terms of the Corps of Engineers' Criteria.

Further analyses of Cases II, III and IV to determine maximum foundation pressures associated with the otherwise unacceptable eccentric loading show that maximum bearing pressures ranging between 31.39 and 33.52 psi would result. These values are well within the allowable bearing capacity available from the foundation rock. Minimum bearing values resulting from the eccentric loading of the foundation were calculated to range between -13.00 and -4.54 psi.

With consideration of the relatively low bearing pressures resulting from the otherwise unacceptable resultant force eccentricities as compared to that available from the competent foundation rock the stability of the dam for Cases II, III and IV with regards to overturning is considered acceptable.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT

a. Safety

Examination of available documents and the visual inspection of the Greenhaven Correction Facility Dam and appurtenant structures did not reveal any conditions which constitute a hazard to human life or property. The dam is not considered to be unsafe.

Using the Corps of Engineers' screening criteria for review of spillway adequacy, it has been determined that the concrete gravity dam would be overtopped for all storms exceeding approximately 38.8 percent of the PMF. Although the spillway capacity is inadequate from a hydraulic and hydrologic point of view, the hydraulic inadequacy will not affect the safety of the dam because the concrete dam is supported on sound rock and overtopping of the dam will cause neither significant erosion at the toe or abutment, nor undermine the foundation of the dam. In addition, the concrete dam is stable under all loading conditions.

b. Adequacy of Information

The information and data available were adequate for performance of this investigation.

c. Necessity of Additional Investigations

No additional investigations are required.

d. Urgency

The recommended measures 1 through 5 as described below must be taken within 1 year from notification.

7.2 RECOMMENDED MEASURES

The following are the recommended measures:

1. Removal of trash and debris from spillway channel.
2. Repair reservoir drain control works.
3. Remove vegetation from spillway crest and chute.
4. Repair cracked and deteriorating concrete on abutment spillway chute.
5. Back fill spillway chute wall and protect slope against erosion.
6. Provide a program of periodic inspection and maintenance of the dam and appurtenances including yearly operation and lubrication of the reservoir drain. Document this information for future references. Also develop an emergency action plan.

DRAWINGS

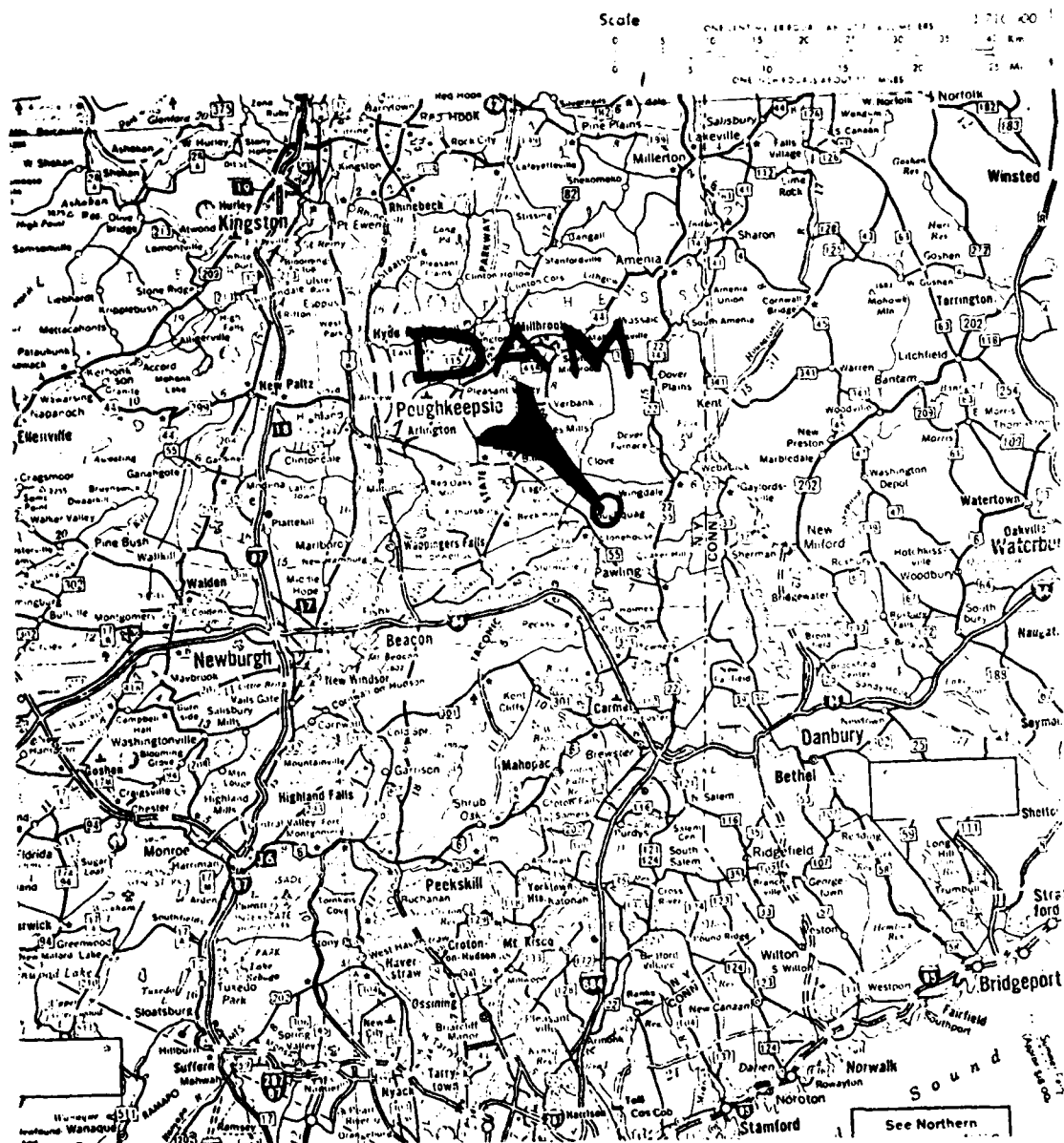
VICINITY MAP

TOPOGRAPHIC MAP

- Plate 1. Layout of Dam
- Plate 2. Section of Dam
- Plate 3. Gatehouse
- Plate 4. Spillway Section 0+74
- Plate 5. Section at Gatehouse (See plate 3)
- Plate 6. Section at Gatehouse (See plate 3)
- Plate 7. Section along Dam Centerline
- Plate 8. Section at Sta. 1+24

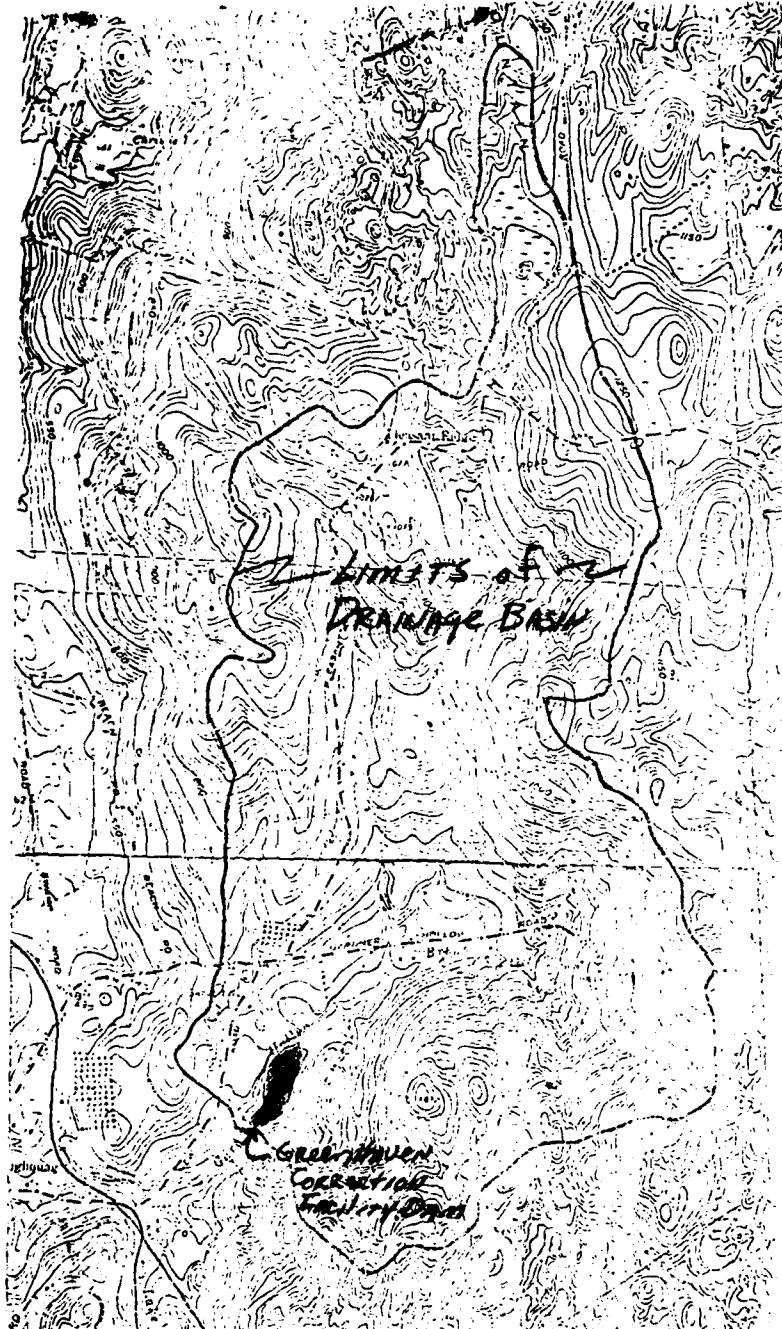
Note: Pertinent information regarding Dam ,
Spillway and Gatehouse were photographically
reproduced and are included in the Appendix.
The complete set of drawings are with the
owner (See Section 2.3)

APPENDIX A



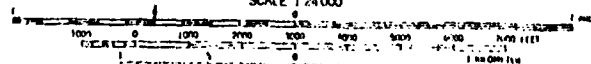
VICINITY MAP
GREENHAVEN CORRECTION FACILITY DAM

VERBANK, N.Y. QUAD.
POUGHQUAG, N.Y. QUAD.

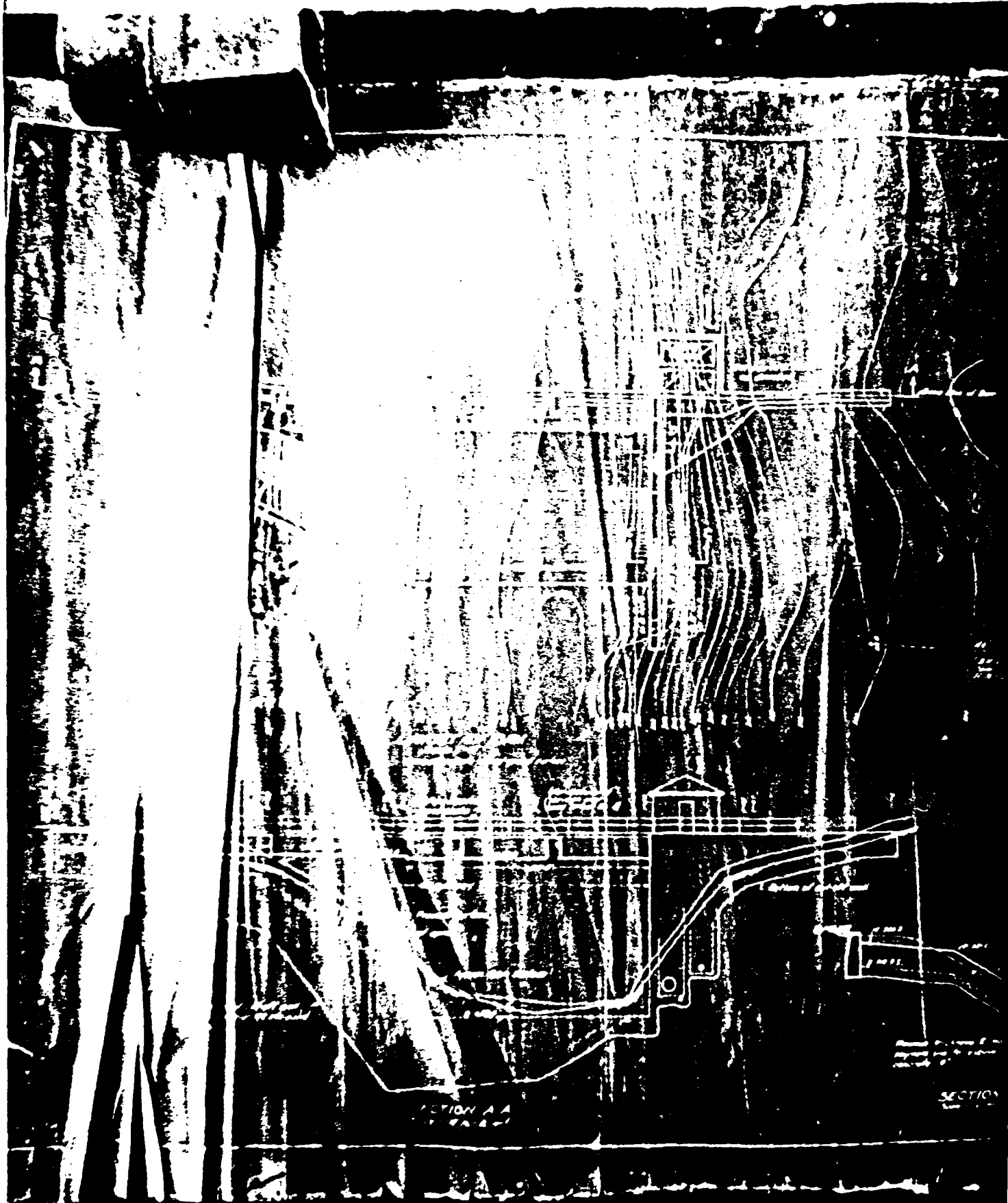


TOPOGRAPHIC MAP
GREENHAVEN CORRECTION FACILITY DAM

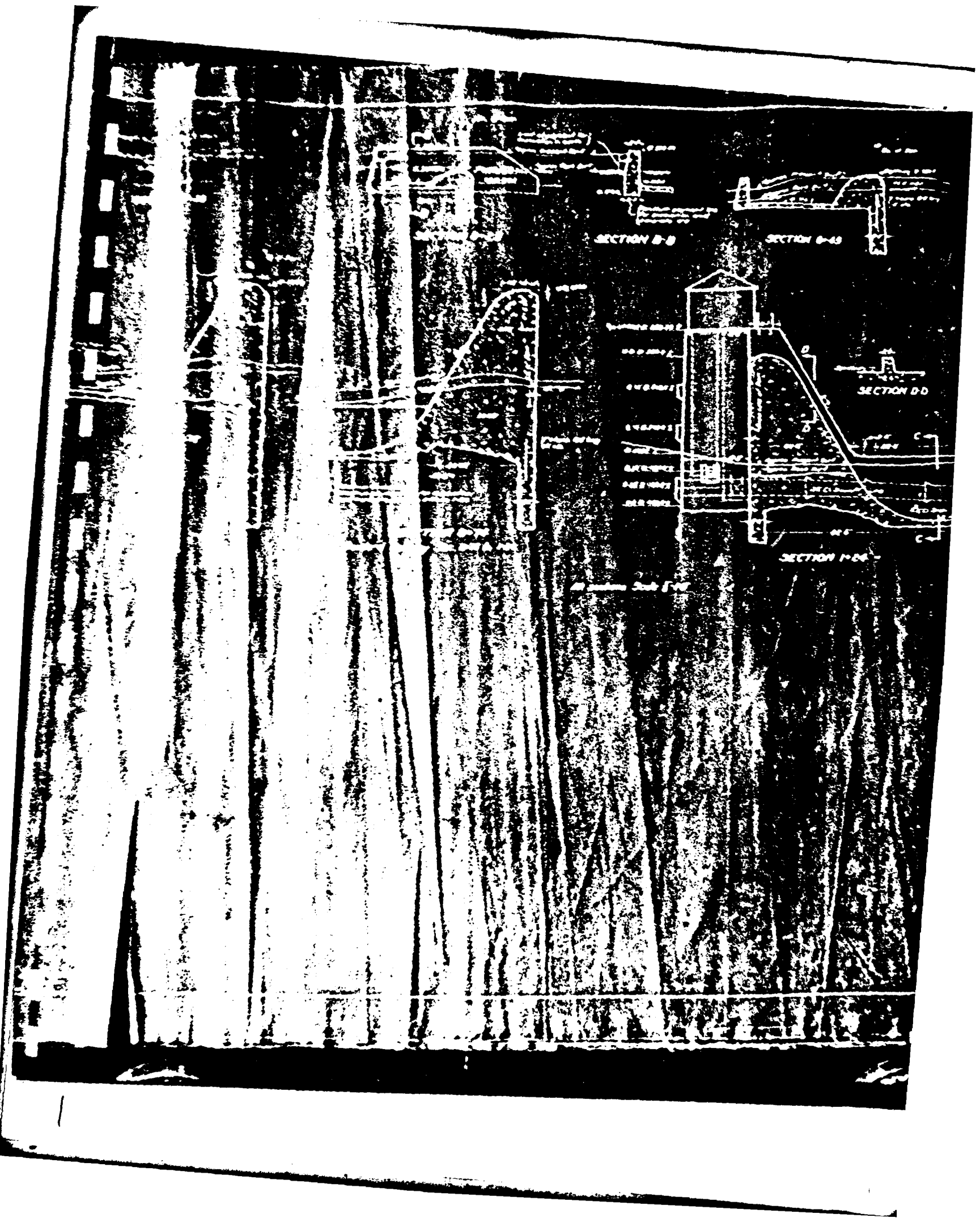
SCALE 1:24,000



CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL







SECTION B-B

SECTION C-C

SECTION D-D

SECTION E-E

WATER INLET

WATER OUTLET

WATER INLET

WATER OUTLET

WATER INLET

WATER OUTLET

WATER INLET

WATER OUTLET

WATER INLET

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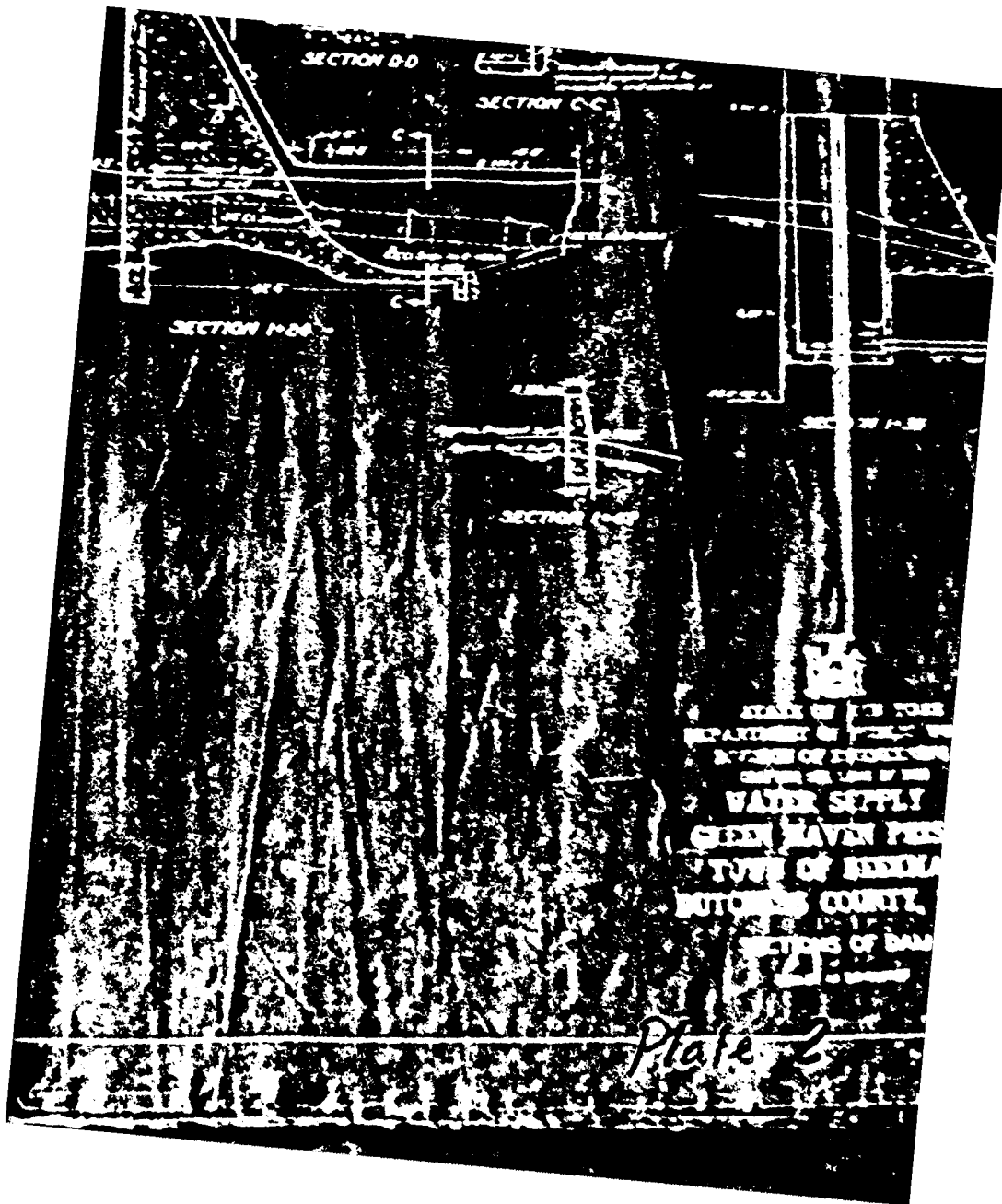
WATER OUTLET

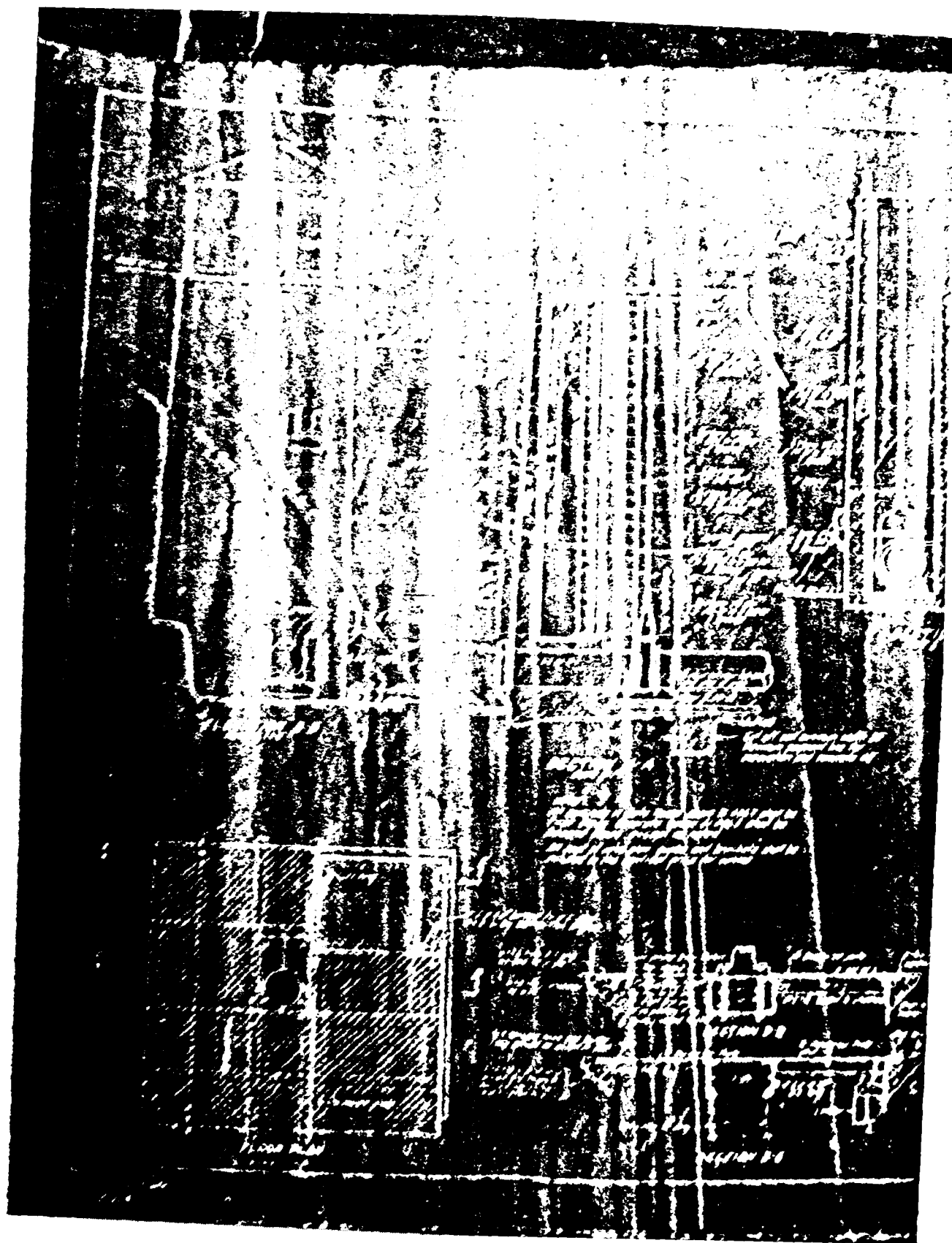
WATER INLET

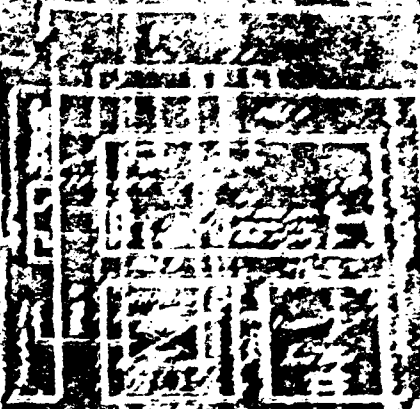
WATER OUTLET

WATER INLET

WATER OUTLET

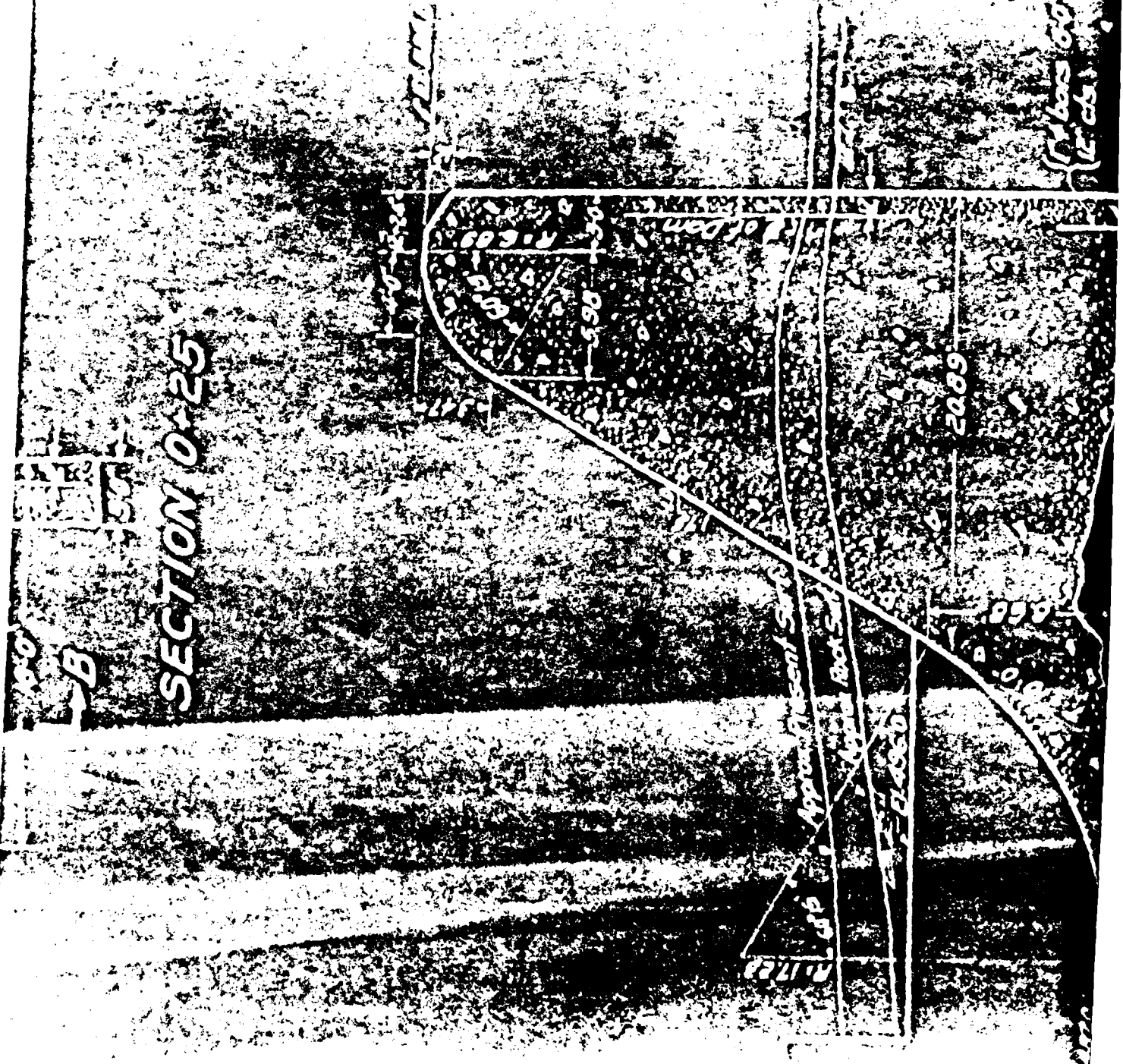






STATE OF NEW YORK
COUNTY OF ALBANY
JAMES H. HARRIS
CLERK OF THE COURT
JAMES H. HARRIS
CLERK OF THE COURT
JAMES H. HARRIS
CLERK OF THE COURT

ALBANY, N. Y.
JANUARY 1, 1900
JAMES H. HARRIS
CLERK OF THE COURT
JAMES H. HARRIS
CLERK OF THE COURT
JAMES H. HARRIS
CLERK OF THE COURT



SECTION 0+25

B

(12' dia)

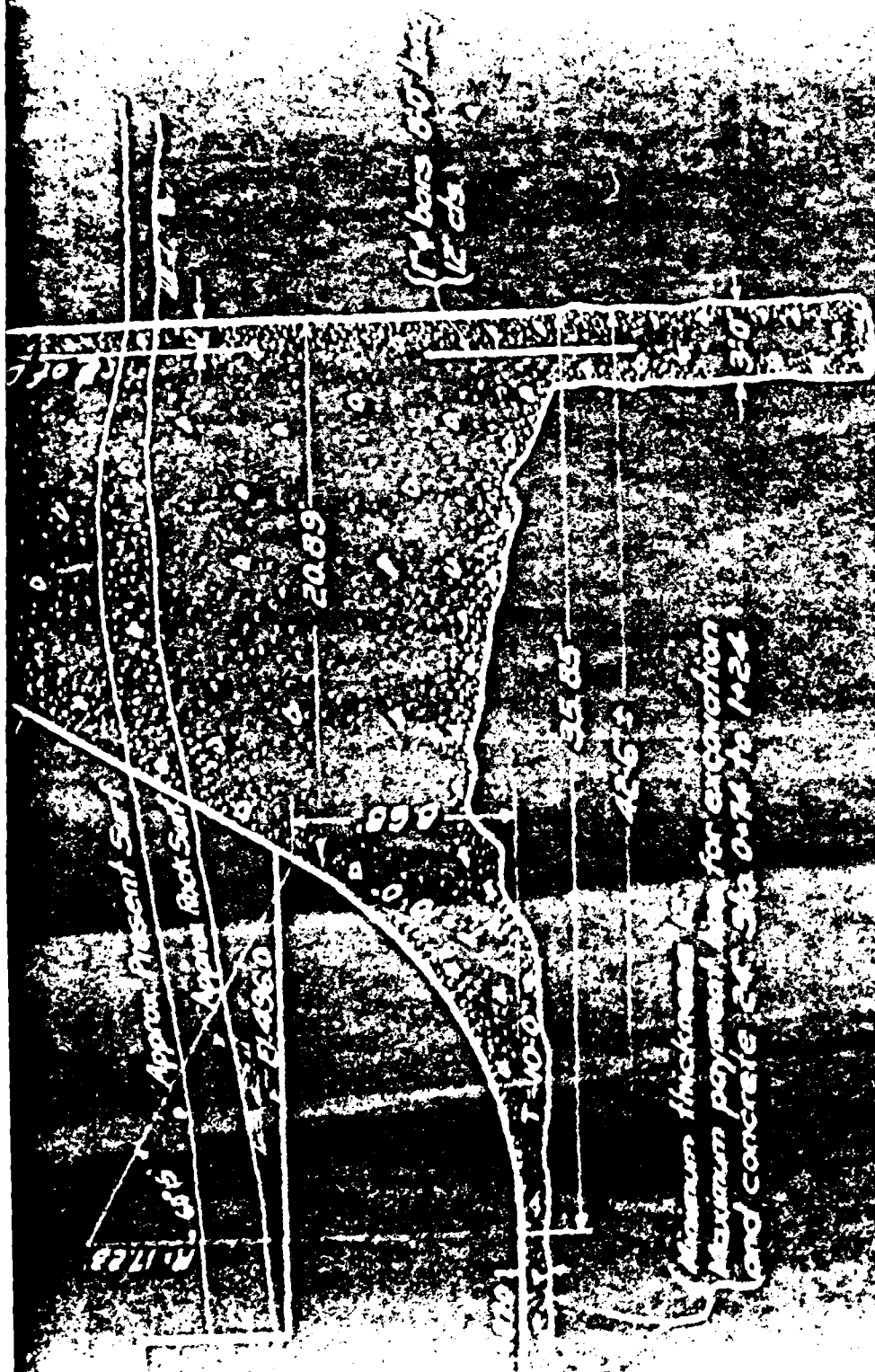
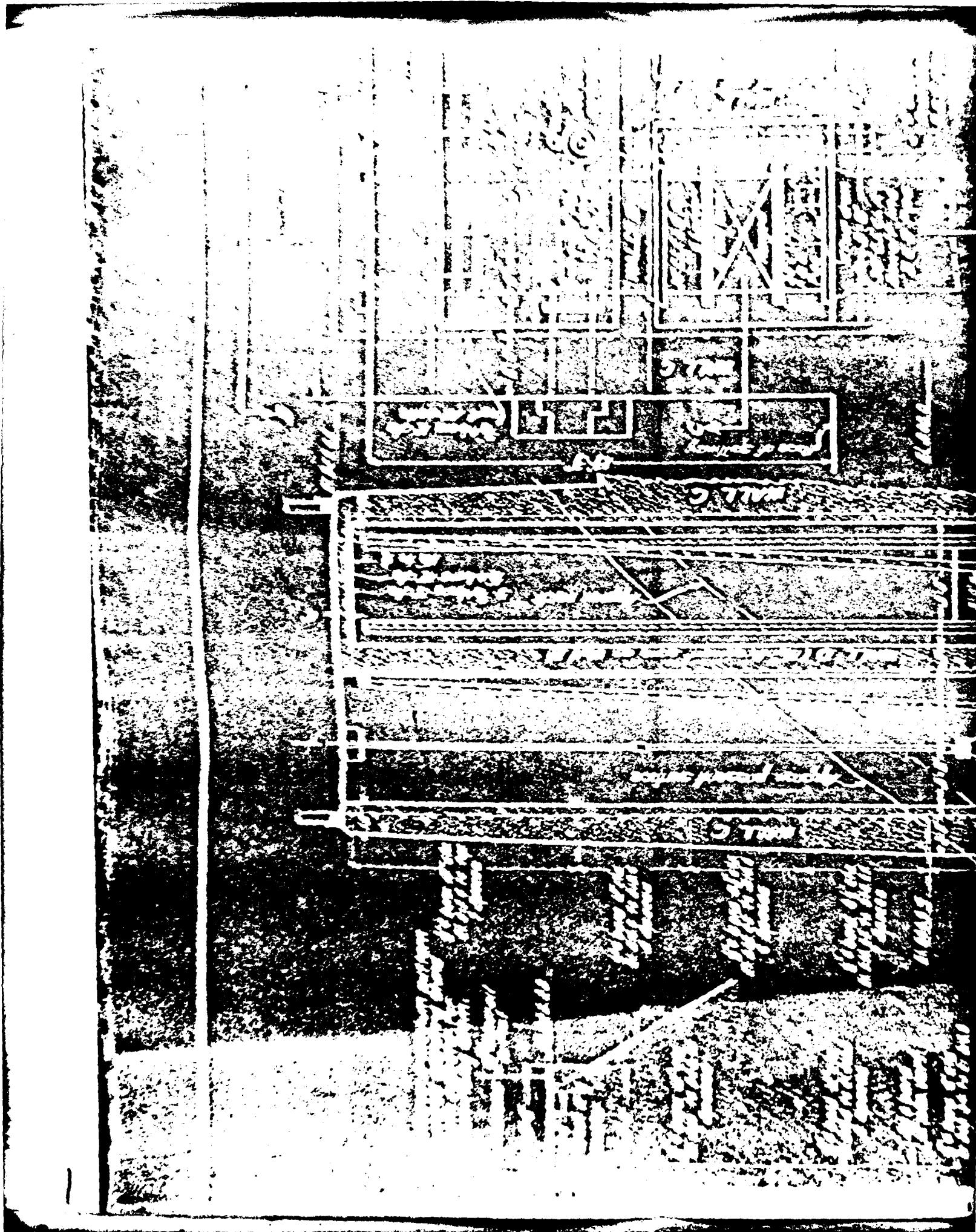
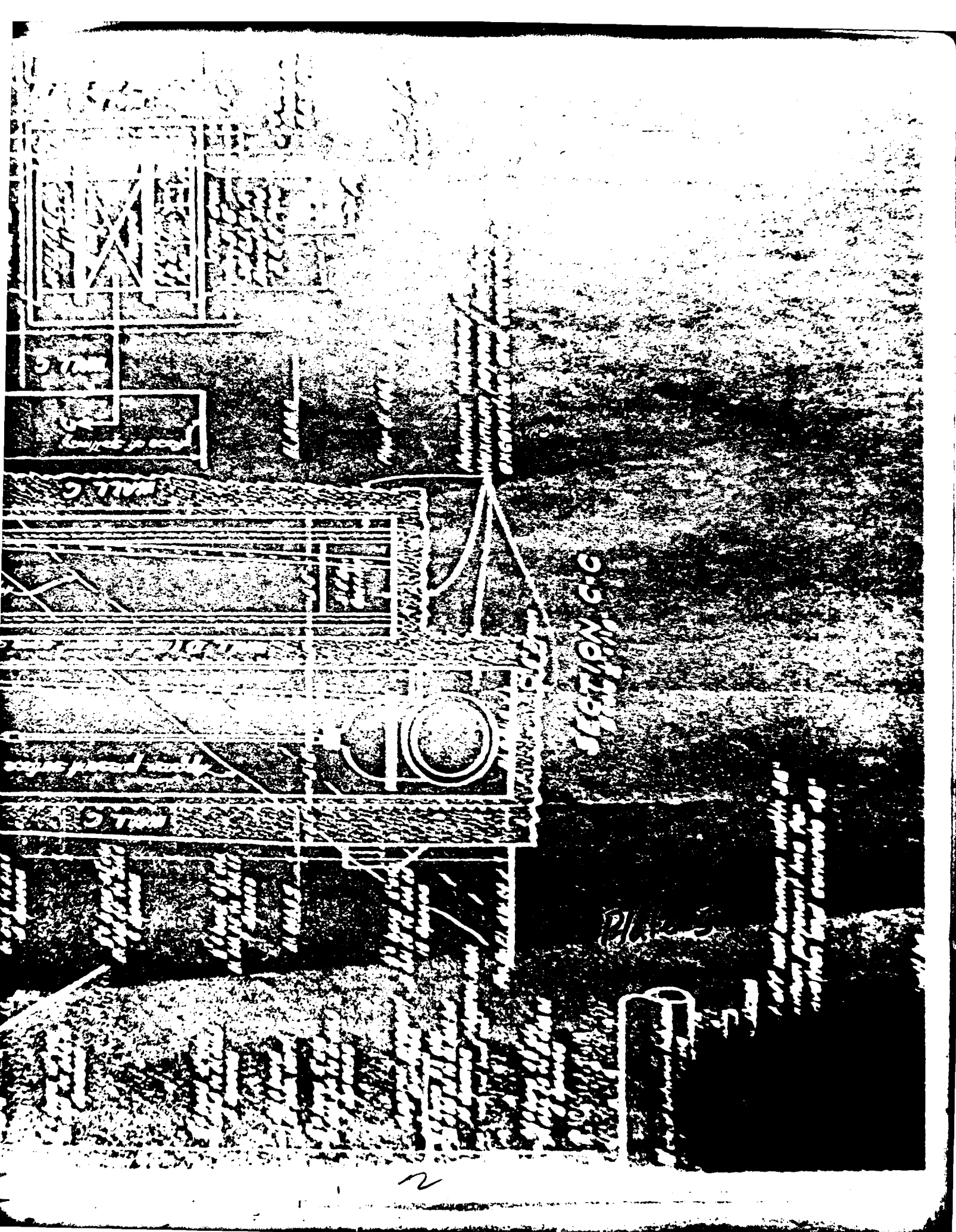
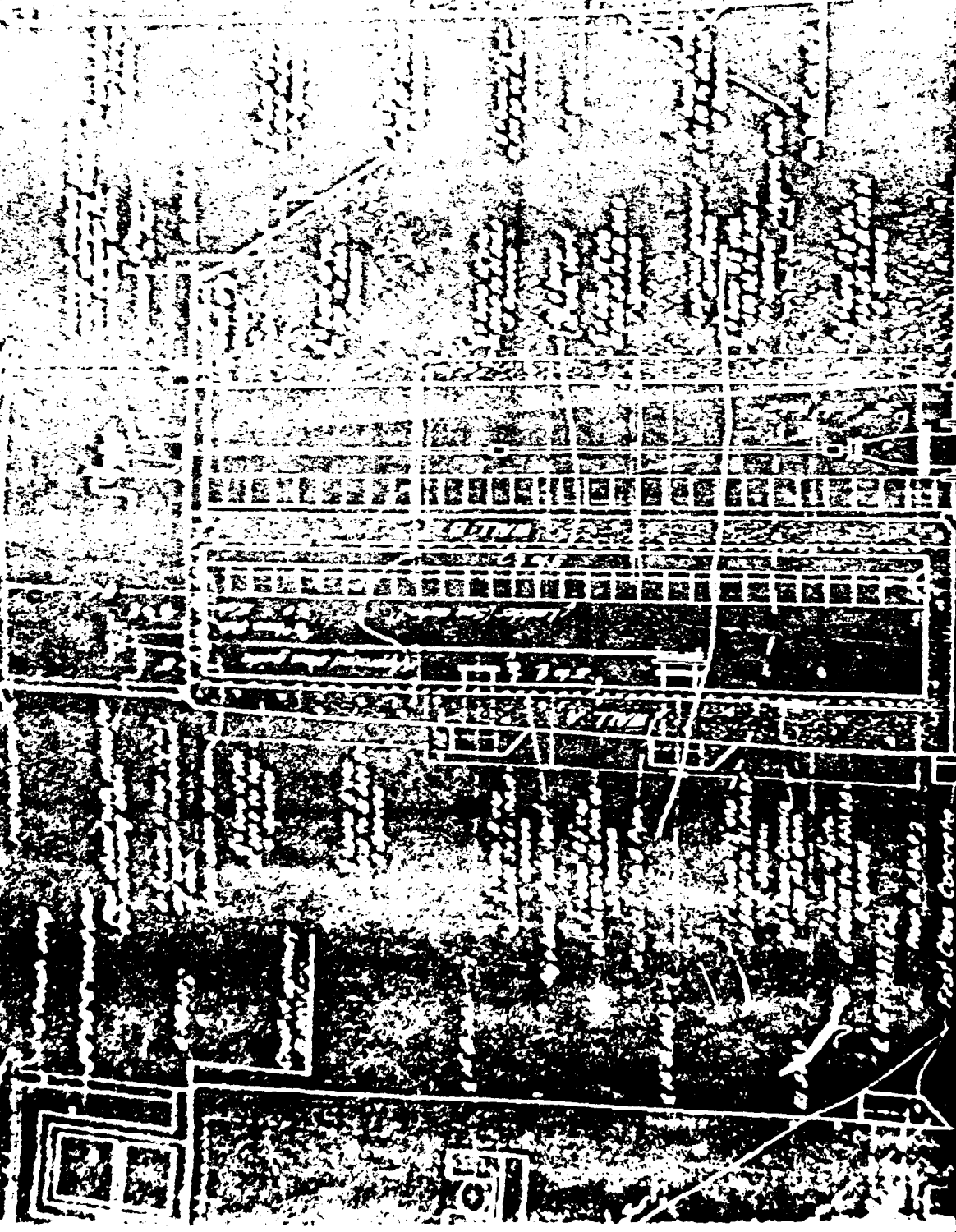


Plate 4

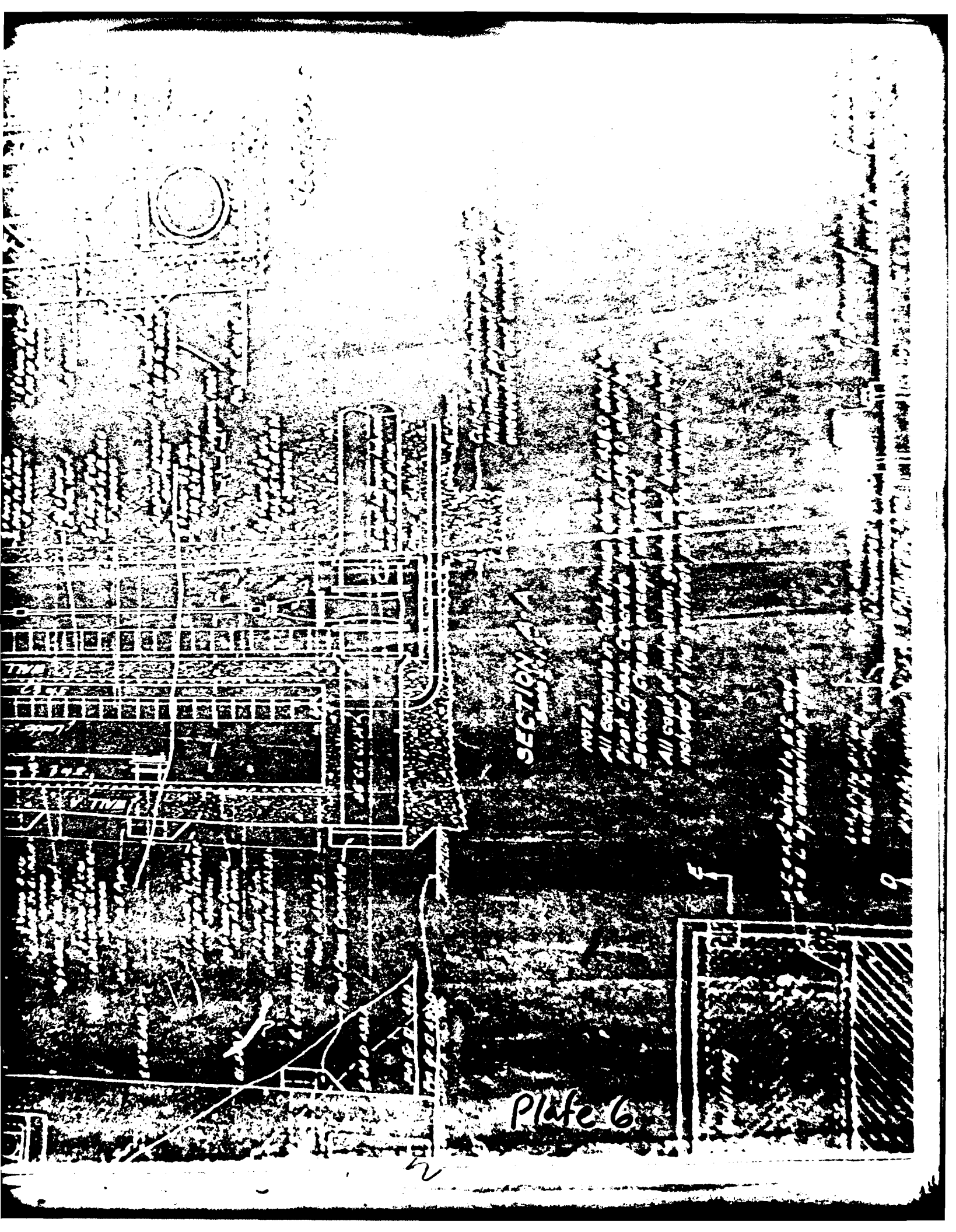






First Class Certificate

10



SECTION A-A

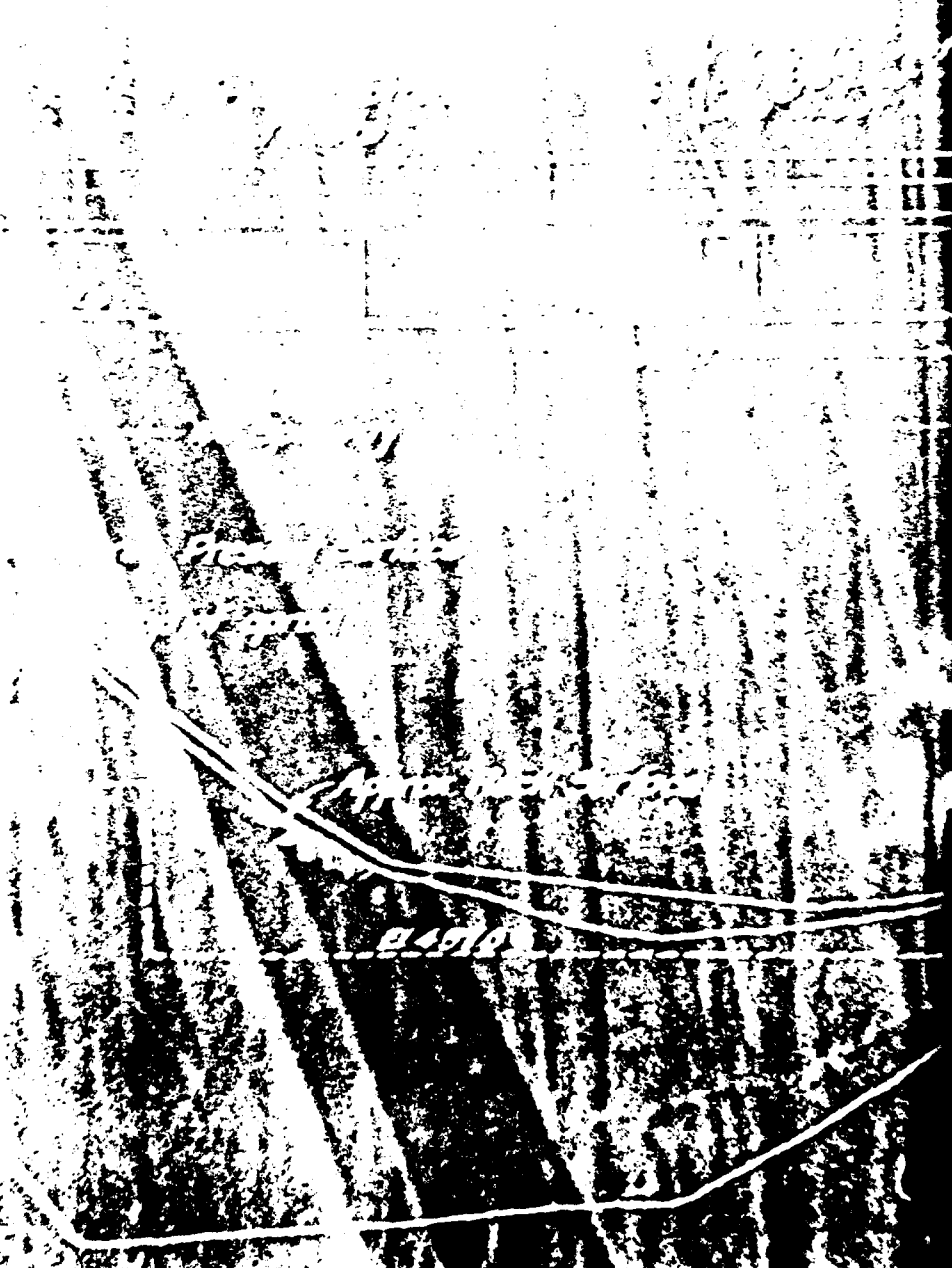
NOTE:

All concrete in walls and floors is 1500 psi concrete.
First Class Concrete.
Second Class concrete.
All cast in place concrete.
No reinforcement in the concrete.

5' - 0" - 0" by dimension

Plate 6

1000 1000 1000



36

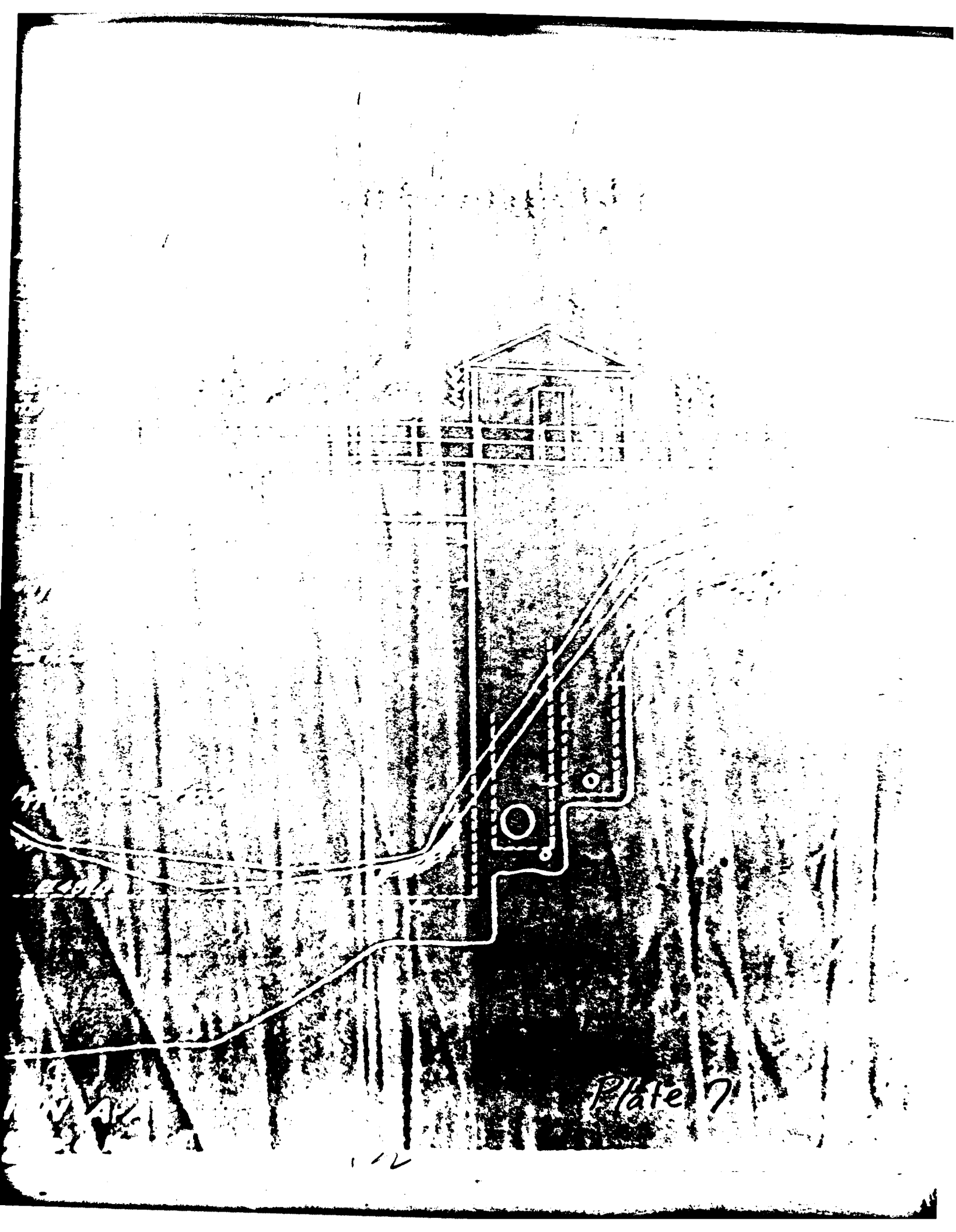


Plate 7

100' 2' 0"

100' 2' 0"

100' 2' 0"

100' 2' 0"

100' 2' 0"

100' 2' 0"

100' 2' 0"

100' 2' 0"



Spillway

SEC

SECTION 1+24

Sections Scale 1/4\"/>

SECTION D-D

SECTION C-C

2000

★ SURF ★

~~36" C.A. Blowoff Line~~

ACCORDANCE

·TION 1-24

Plate 8

PHOTOGRAPHS

APPENDIX B



2) CENTERLINE VIEW OF DAM FROM LEFT ABUTMENT
(NOTE UPPER LEVEL SPILLWAY CHUTE ON RIGHT
ABUTMENT)



3) VIEW OF UPSTREAM FACE OF DAM FROM RIGHT ABUTMENT
(NOTE LOCATION OF GATEHOUSE AT LEFT ABUTMENT)



4) HIGH LEVEL SPILLWAY CHUTE
ON RIGHT ABUTMENT - (NOTE
CRACKING, SPALLING, GROWTH
OF VEGETATION AND SEEPAGE
AT INTERSECTION WITH DAM)



5) DOWNSTREAM WALL OF HIGH LEVEL SPILLWAY CHUTE
(NOTE CRACKS AND EROSION)



6) GARDNER HOLLOW BROOK IMMEDIATELY
DOWNSTREAM OF DAM



7) TYPICAL WALKWAY PIER
ON DAM CREST-(NOTE
MINOR SPALLING OF
CONCRETE)



8) RESERVOIR DRAIN CONTROL
(NOTE MISSING GEAR AND
HANDLE ASSEMBLY)



9) RESERVOIR DRAIN OUTLET ON
DOWNSTREAM LEFT ABUTMENT

VISUAL INSPECTION CHECKLIST

APPENDIX C

VISUAL INSPECTION CHECKLIST

1) Basic Data

a. General

Name of Dam Greenhaven Correction Facility Dam
Fed. I.D. # NY 01170 DEC Dam No. 230C-4123
River Basin Lower Hudson River
Location: Town BeeKraan County Dutchess
Stream Name Gaelure Hollow Brook
Tri'utary of Whaley Lake Stream
Latitude (N) 41°36.7' Longitude (W) 073°39.8'
Type of Dam Concrete Gravity
Hazard Category HIGH
Date(s) of Inspection 8 July 1981
Weather Conditions Clear - Hot - 98°F
Reservoir Level at Time of Inspection 520.1

b. Inspection Personnel Harvey J. Harkin + John McNamee

c. Persons Contacted (Including Address & Phone No.) (914)-221-2711
Mr. Angelo LONARDO, Plant Superintendent, Greenhaven Correction
Facility, New York State Department of Correction, Stormville, NY 12582

d. History:

Date Constructed 1940 Date(s) Reconstructed UNKNOWN
Designer New York State
Constructed By New York State
Owner NYS Department of Corrections

2) Embankment

a. Characteristics

- (1) Embankment Material No Embankment
- (2) Cutoff Type N/A
- (3) Impervious Core N/A
- (4) Internal Drainage System N/A
- (5) Miscellaneous N/A

b. Crest

- (1) Vertical Alignment N/A
- (2) Horizontal Alignment N/A
- (3) Surface Cracks N/A
- (4) Miscellaneous N/A

c. Upstream Slope

- (1) Slope (Estimate) (V:H) N/A
- (2) Undesirable Growth or Debris, Animal Burrows N/A
- (3) Sloughing, Subsidence or Depressions N/A

(4) Slope Protection N/A

(5) Surface Cracks or Movement at Toe N/A

d. Downstream Slope

(1) Slope (Estimate - V:H) N/A

(2) Undesirable Growth or Debris, Animal Burrows N/A

(3) Sloughing, Subsidence or Depressions N/A

(4) Surface Cracks or Movement at Toe N/A

(5) Seepage N/A

(6) External Drainage System (Ditches, Trenches; Blanket) N/A

(7) Condition Around Outlet Structure N/A

(8) Seepage Beyond Toe N/A

e. Abutments - Embankment Contact

N/A

(1) Erosion at Contact N/A

(2) Seepage Along Contact N/A

3) Drainage System

a. Description of System None

b. Condition of System N/A

c. Discharge from Drainage System N/A

4) Instrumentation (Monumentation/Surveys, Observation Wells, Weirs, Piezometers, Etc.) None observed on drawings or in the

5) Reservoir

- a. Slopes Relatively flat and stable in general
vicinity of the Dam
- b. Sedimentation NONE OBSERVABLE
- c. Unusual Conditions Which Affect Dam Frequent Vandalism of
gate house

6) Area Downstream of Dam

- a. Downstream Hazard (No. of Homes, Highways, etc.) Route 216 (1/2 mile SSW)
NO HOUSES OR STRUCTURES WITHIN 1/2 mile
- b. Seepage, Unusual Growth NONE OBSERVED
- c. Evidence of Movement Beyond Toe of Dam NONE OBSERVED
- d. Condition of Downstream Channel Fair - few fallen trees & debris
partially block the brook

7) Spillway(s) (Including Discharge Conveyance Channel)

- bilateral central overflow section down face of dam
- a. General flow through lower overflow section is directed
down face of dam, upper overflow section is in
in a state being the right maintained the dam &
works to the face of the dam
- b. Condition of Service Spillway GOOD in general FOR 1911
at right important secondary chute for upper
spillways has been required by granite masonry
cracking, spalling and breakage of the surface has
occurred since its repair

c. Condition of Auxiliary Spillway NONE

d. Condition of Discharge Conveyance Channel Fair

8) Reservoir Drain/Outlet

Type: Pipe ☒ Conduit _____ Other _____

Material: Concrete _____ Metal _____ Other ST. 5/A

Size: 36" diam Length 65 feet

Invert Elevations: Entrance 481.5 Exit 478.5

Physical Condition (Describe): _____ Unobservable _____

Material: UNOBSERVABLE

Joints: _____ Alignment _____

Structural Integrity: UNOBSERVABLE

Hydraulic Capability: _____

Means of Control: Gate ☒ Valve _____ Uncontrolled _____

Operation: Operable _____ Inoperable _____ Other ☒

Present Condition (Describe): Reportedly operated

but was damaged as a result of installation
and repair work

9) Structural

- a. Concrete Surfaces minor spalling of crosswalk piers,
turning wall of right upper level chute was cracked with
portions of granite resurfacing at toe missing
- b. Structural Cracking NONE OBSERVABLE ON DAM
- c. Movement - Horizontal & Vertical Alignment (Settlement) NO SIGNIFICANT
MOVEMENT COULD BE OBSERVED
- d. Junctions with Abutments or Embankments GOOD - NO DISPLACEMENT
OBSERVED
- e. Drains - Foundation, Joint, Face NONE
- f. Water Passages, Conduits, Sluices NONE
- g. Seepage or Leakage MINOR SEEPAGE ON FACE OF CHUTE
AND SPALLING CHUTE

h. Joints - Construction, etc. Appear good

i. Foundation Cutoff wall keyed into bedrock

j. Abutments Rock

k. Control Gates Reservoir chain is reportedly in working condition - main spillway is controlled

l. Approach & Outlet Channels NO approach channel -
Outlet channel is same as natural channel of
Canaan Hollow Brook - partially blocked by
fallen trees and water logs

m. Energy Dissipators (Plunge Pool, etc.) None

n. Intake Structures Unobservable

o. Stability APPEARS STABLE

p. Miscellaneous

10) Appurtenant Structures (Powerhouse, Lock, Gatehouse, Other)

a. Description and Condition

For description of

spillway

see section 7.

HYDROLOGIC DATA AND COMPUTATIONS

APPENDIX. D

CHECK LIST FOR DAMS
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

1

AREA-CAPACITY DATA:

	<u>Elevation</u> (ft.)	<u>Surface Area</u> (acres)	<u>Storage Capacity</u> (acre-ft.)
1) Top of Dam	<u>525.25</u>	<u>23.5</u>	<u>322</u>
2) Design High Water (Max. Design Pool)	<u>UNKNOWN</u>	<u>—</u>	<u>—</u>
3) Auxiliary Spillway Crest	<u>N/A</u>	<u>—</u>	<u>—</u>
4) Pool Level with Flashboards	<u>N/A</u>	<u>—</u>	<u>—</u>
5) Service Spillway Crest	<u>Low Level - High Level</u> <u>520.0 520.5</u>	<u>12.7</u>	<u>240</u>

DISCHARGES

	<u>Volume</u> (cfs)
1) Average Daily	<u>UNKNOWN</u>
2) Spillway @ Maximum High Water	<u>3324</u>
3) Spillway @ Design High Water	<u>N/A</u>
4) Spillway @ Auxiliary Spillway Crest Elevation	<u>N/A</u>
5) Low Level Outlet	<u>UNKNOWN</u>
6) Total (of all facilities) @ Maximum High Water	<u>3324+</u>
7) Maximum Known Flood	<u>UNKNOWN</u>
8) At Time of Inspection	<u>UNKNOWN</u>

Dam
CREST:

ELEVATION: 525.25

Type: Concrete Gravity

Width: 6 feet Length: 176'

Spillover Control Spillway upstream of spillway section

Location Center of Dam

SPILLWAY:

SERVICE

AUXILIARY

low level 520.0 high level 520.5 Elevation

uncontrolled spillway section Type NONE

100' Width

Type of Control

☒ Uncontrolled

Controlled:

 Type
(Flashboards; gate)

 Number

 Size/Length

Invert Material

Anticipated Length
of operating service

60 feet Chute Length

N/A Height Between Spillway Crest
& Approach Channel Invert
(Weir Flow)

HYDROMETEROLOGICAL GAGES:

Type : NONE

Location: _____

Records:

Date - _____

Max. Reading - _____

FLOOD WATER CONTROL SYSTEM:

Warning System: NONE

Method of Controlled Releases (mechanisms):

NONE

DRAINAGE AREA: 4.45 sq. miles

DRAINAGE BASIN RUNOFF CHARACTERISTICS:

Land Use - Type: FARMING

Terrain - Relief: MODERATELY TO STEEPLY SLOPING

Surface - Soil: LOAM

Runoff Potential (existing or planned extensive alterations to existing (surface or subsurface conditions)

Potential Sedimentation problem areas (natural or man-made; present or future)

NONE

Potential Backwater problem areas for levels at maximum storage capacity including surcharge storage:

NONE

Dikes - Floodwalls (overflow & non-overflow) - Low reaches along the Reservoir perimeter:

Location: NONE

Elevation: _____

Reservoir:

Length @ Maximum Pool 0.36 (Miles)

Length of Shoreline @ Spillway Crest 0.68 (Miles)

TAMS

Job No. 1579-20 Sheet 1 of 18
Project GREENHAVEN CORRECTIONAL FACILITY RES. Date JUL. 21, 81
Subject HYDROLOGIC / HYDRAULIC Computations By D.L.C.
HUC # 02020008 Ch'k. by _____

SNYDER'S COEF: $C_T = 2.0$

$$C_P = 0.625.$$

$$T_P = C_T (L L_{CA})^{0.3}$$

$$L = 8.5'' = 17,000 \text{ ft} = 3.22 \text{ miles}$$

$$L_{CA} = 3.0'' = 6,000 \text{ ft} = 1.14 \text{ miles.}$$

$$T_P = 2.0 (3.22 \times 1.14)^{0.3}$$
$$= 2.95$$

$$t_n = 2.95 / 5.5 = 0.536$$

$$\text{Use } t_R = 0.50.$$

$$t_{PR} = t_P + 0.25(t_R - t_n)$$

$$= 2.95 - 0.01$$

$$= 2.94 \text{ hours.}$$

$$\text{INITIAL LOSS} = 1.0 \text{ inch.}$$

$$\text{Constant Loss} = 0.1 \text{ inch/hour.}$$

$$\text{LAKE AREA} = 14.7 \text{ ac.}$$

$$D/\text{Area} = 2850 \text{ ac.}$$

$$\% \text{ Impermeous} = 0.5 \%$$

TAMS

Job No.

Project

Subject

GREENHAVEN CORRECTIONAL FACILITY DAM.
HYDROLOGIC/HYDRAULIC COMPUTATIONS

Sheet 2 of 18

Date July 21, 81

By D.L.C.

Ch'k. by _____

SPILLWAY RATING.

Effective length @ crest EL. 520 = 45.0'

Effective length @ crest EL. 520.5 = 45.0'

Top of DAM EL. 523.5.

Walkway Over Spillway assumed 'washed out'
during PMF Analysis. USE $C = 3.3$.

EL.	H_1	Q_1	H_2	Q_2	Q_{TOTAL}
520	0		-		0
520.5	0.5	52.5	0	0	52.5
521.5	1.5	272.8	1	148.5	421.3
523.5	3.5	972.4	3	771.6	1744.0
525.25	5.25	1786.3	4.75	1537.3	3323.6
530.0	10.0	4696.	9.5	4348.	9044

DAM LENGTH: 165.0'

USE $C = 2.8$ for top of dam.

FROM HYDROMET # 33 Zone 1

ALL SEASON 200 SQ MI 24 HR PMP = 21.2 inches

DURATION (HRS)	6	12	24	48
% PMP depth.	112	123	133	141

TAMS

Job No. 1579-20

Project GREEN HAVEN C.F. RESERVOIR

Subject _____

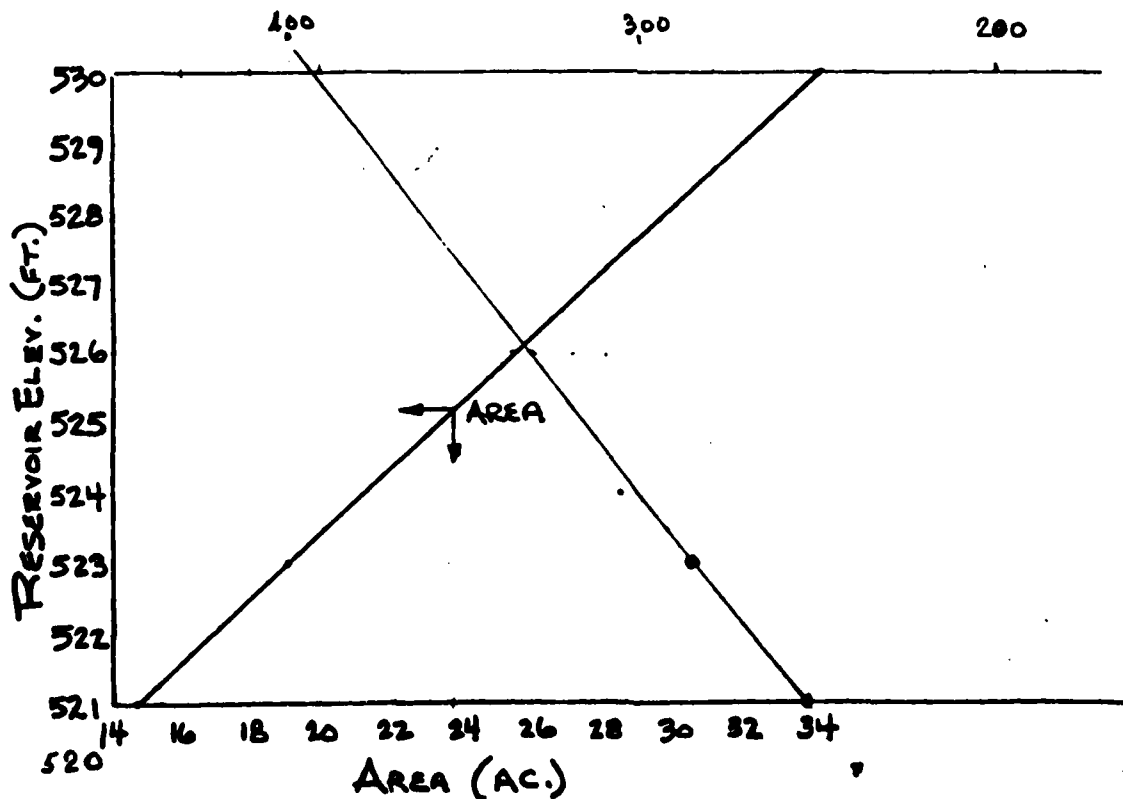
Sheet 3 of 18

Date 7/81

By JMD

Ch'k. by _____

ELEV. (ft.)	ΔH (ft.)	AREA (AC.)	MEAN AREA (AC.)	INC. VOL. (AC.-FT.)	SURCHARGE STORAGE (AC.-FT.)
520		12.7		13.7	0
521		14.7			13.7
	1		15.75	15.8	
522		16.8			29.5
	1		17.9	17.9	
523		19.0			47.4
	1		20.05	20.1	
524		21.1			67.5
	2		23.25	23.3	
526		25.4			90.8
	2		27.55	27.6	
528		29.7			
	2		31.85	31.9	
530		34.0			150.3



TAMS

Job No. 1579-20

Sheet 4 of 18

Project GREEN HAVEN CORRECTIONAL FACILITY RESERVOIR

Date 7/81

Subject _____

By JMD

Ch'k. by _____

FETCH:

$$1900' = 0.36 \text{ mi}$$

PERIMETER (@ EL. 521): $1.8'' = 0.68 \text{ mi.}$

LAKE AREA (@ EL. 521): 0.16 in^2 (4 out of 9 measurings)

$$14.7 \text{ AC} = 0.023 \text{ mi}^2$$

CONTOUR (@ EL. 530):

0.36

0.38

0.37

0.37

$$\text{ave} = 0.37 \text{ in}^2 \Rightarrow 34.0 \text{ AC.} = 0.053 \text{ mi}^2$$

DRAINAGE AREA:

14.01 } POUGHQUAG

14.00 } QUAD

13.99

$$\text{ave} = 14.0 \text{ in}^2$$

17.5 } VERBANK

16.7 } QUAD

16.9

$$\text{ave} = 17.033 \text{ in}^2$$

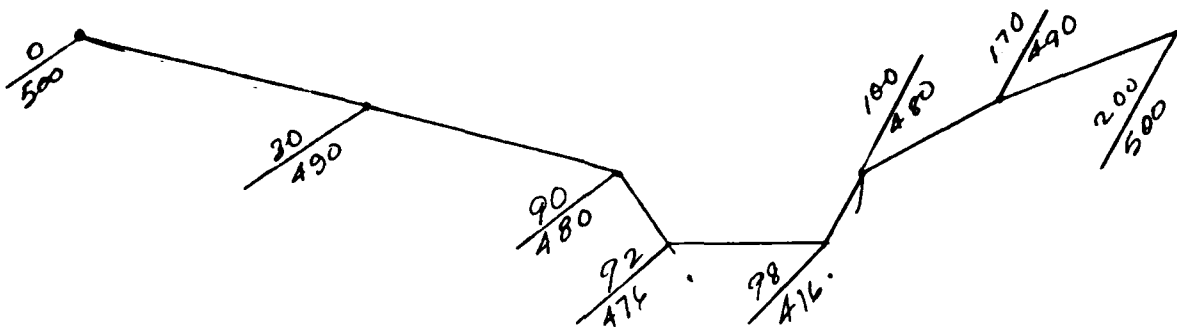
$$1285.6 \text{ ac.} + 1564.1 \text{ ac.} \approx 2850 \text{ AC.} \\ = 4.45 \text{ mi}^2$$

TAMS

Job No. 1579-20
Project GREEN HAVEN CORRECTIONAL FACILITY RESERVOIR.
Subject HYDROLOGIC/HYDRAULIC COMPUTATIONS.

Sheet 5 of 18
Date JULY 22, 1981
By D. L. C.
Ch'k. by _____

Channel Cross Section. -
800 ft downstream of dam



 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION JULY 1978
 LAST MODIFICATION 01 APR 80

RUN DATE= 81/07/28.
 TIME= 11.02.18.

GREENHAVEN CORRECTIONAL FACILITY RESERVOIR
 PHASE 1 DAM SAFETY INSPECTION
 HEC-1DR PWF ANALYSIS

157920

JOB SPECIFICATION

NQ	NMR	NMIN	IDAY	IHR	IMIN	METRC	IPLY	IPRT	NSTAN
100	0	30	0	0	0	0	0	0	0
JOPER			NWT	LROPT	TRACE				
5			0	0	0				

MULTI-PLAN ANALYSES TO BE PERFORMED

NPLAN= 1 NRTIO= 4 LRTIO= 1
 RTIOS= 1.00 .75 .50 .25

SUB-AREA RUNOFF COMPUTATION

1 INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

INYDG	IUNG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	4.45	0.00	4.45	0.00	0.000	0	1	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.20	112.00	123.00	133.00	141.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTR	RTIOL	FRIN	STKRS	RTIOK	SIRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.10	0.00	.01

UNIT HYDROGRAPH DATA

TP= 2.94 CP= .63 NTA= 0

RECESSION DATA

STRIG= -1.00 QRCSH= -.10 RTIOR= 1.50
 APPROXIMATE CLARK COEFFICIENTS FROM GIVEN SNYDER CP AND TP ARE TC= 6.67 AND R= 5.36 INTERVALS

UNIT HYDROGRAPH	27	FRD-OF-PERIOD	ORINATES	LAG=	2.93	HOURS	CP=	.63	VOL=	1.00
40.	147.	441.	560.	618.	599.	519.	80.	431.	357.	
296.	246.	204.	160.	140.	97.	80.	66.	55.		

7/8

818

MO.DA	HR.MN	PERIOD	RATN	EXCS	LOSS	COMP Q	FND-OF-PERIOD FLOW	MO.DA	HR.MN	PERIOD	RATN	EXCS	LOSS	COMP Q
1.01	1.30	1	.00	.00	.00	4.	1.02	1.02	1.30	51	.06	.01	.05	12.
1.01	1.00	2	.00	.00	.00	4.	1.02	1.02	2.00	52	.06	.01	.05	13.
1.01	1.30	3	.00	.00	.00	4.	1.02	1.02	2.30	53	.06	.01	.05	16.
1.01	2.00	4	.00	.00	.00	4.	1.02	1.02	3.00	54	.06	.01	.05	19.
1.01	2.30	5	.00	.00	.00	4.	1.02	1.02	3.30	55	.06	.01	.05	23.
1.01	3.00	6	.00	.00	.00	4.	1.02	1.02	4.00	56	.06	.01	.05	25.
1.01	3.30	7	.00	.00	.00	3.	1.02	1.02	4.30	57	.06	.01	.05	28.
1.01	4.00	8	.00	.00	.00	3.	1.02	1.02	5.00	58	.06	.01	.05	30.
1.01	4.30	9	.00	.00	.00	3.	1.02	1.02	5.30	59	.06	.01	.05	31.
1.01	5.00	10	.00	.00	.00	3.	1.02	1.02	6.00	60	.06	.01	.05	33.
1.01	6.00	11	.00	.00	.00	3.	1.02	1.02	6.30	61	.16	.11	.05	38.
1.01	7.00	12	.00	.00	.00	3.	1.02	1.02	7.00	62	.16	.11	.05	53.
1.01	7.30	13	.01	.00	.01	3.	1.02	1.02	7.30	63	.16	.11	.05	23.
1.01	8.00	14	.01	.00	.01	3.	1.02	1.02	8.00	64	.16	.11	.05	127.
1.01	8.30	15	.01	.00	.01	3.	1.02	1.02	8.30	65	.16	.11	.05	183.
1.01	9.00	16	.01	.00	.01	2.	1.02	1.02	9.00	66	.16	.11	.05	244.
1.01	9.30	17	.01	.00	.01	2.	1.02	1.02	9.30	67	.16	.11	.05	304.
1.01	10.00	18	.01	.00	.01	2.	1.02	1.02	10.00	68	.16	.11	.05	355.
1.01	10.30	19	.01	.00	.01	2.	1.02	1.02	10.30	69	.16	.11	.05	398.
1.01	11.00	20	.01	.00	.01	2.	1.02	1.02	11.00	70	.16	.11	.05	434.
1.01	11.30	21	.01	.00	.01	2.	1.02	1.02	11.30	71	.16	.11	.05	463.
1.01	12.00	22	.01	.00	.01	2.	1.02	1.02	12.00	72	.16	.11	.05	488.
1.01	12.30	23	.01	.00	.01	2.	1.02	1.02	12.30	73	.95	.90	.05	540.
1.01	13.00	24	.06	.00	.06	2.	1.02	1.02	13.00	74	.95	.90	.05	674.
1.01	13.30	25	.06	.00	.06	2.	1.02	1.02	13.30	75	1.14	1.09	.05	926.
1.01	14.00	26	.06	.00	.06	2.	1.02	1.02	14.00	76	1.14	1.09	.05	1316.
1.01	14.30	27	.07	.00	.07	2.	1.02	1.02	14.30	77	1.42	1.37	.05	1836.
1.01	15.00	28	.07	.00	.07	2.	1.02	1.02	15.00	78	1.42	1.37	.05	2461.
1.01	16.00	29	.09	.00	.09	2.	1.02	1.02	16.00	79	1.73	1.68	.05	3145.
1.01	17.00	30	.09	.00	.09	2.	1.02	1.02	17.00	80	5.49	5.44	.05	4001.
1.01	18.00	31	.10	.00	.10	2.	1.02	1.02	18.00	81	1.33	1.28	.05	5095.
1.01	19.00	32	.33	.01	.32	3.	1.02	1.02	19.00	82	1.33	1.28	.05	6272.
1.01	20.00	33	.08	.03	.05	5.	1.02	1.02	20.00	83	1.04	.99	.05	7373.
1.01	21.00	34	.08	.03	.05	11.	1.02	1.02	21.00	84	1.04	.99	.05	8203.
1.01	22.00	35	.06	.01	.05	21.	1.02	1.02	22.00	85	.08	.04	.05	8601.
1.01	23.00	36	.06	.01	.05	32.	1.02	1.02	23.00	86	.08	.04	.05	8461.
1.01	24.00	37	.01	.00	.01	44.	1.02	1.02	24.00	87	.08	.04	.05	7850.
1.01	25.00	38	.01	.00	.01	53.	1.02	1.02	25.00	88	.08	.04	.05	7015.
1.01	26.00	39	.01	.00	.01	57.	1.02	1.02	26.00	89	.08	.04	.05	6112.
1.01	27.00	40	.01	.00	.01	55.	1.02	1.02	27.00	90	.08	.04	.05	5209.
1.01	28.00	41	.01	.00	.01	50.	1.02	1.02	28.00	91	.08	.04	.05	4376.
1.01	29.00	42	.01	.00	.01	43.	1.02	1.02	29.00	92	.08	.04	.05	3664.
1.01	30.00	43	.01	.00	.01	36.	1.02	1.02	30.00	93	.08	.04	.05	3073.
1.01	31.00	44	.01	.00	.01	30.	1.02	1.02	31.00	94	.08	.04	.05	2583.
1.01	32.00	45	.01	.00	.01	25.	1.02	1.02	32.00	95	.08	.04	.05	2176.
1.01	33.00	46	.01	.00	.01	21.	1.03	1.03	33.00	96	.08	.04	.05	1839.
1.01	34.00	47	.01	.00	.01	17.	1.03	1.03	34.00	97	0.00	0.00	0.00	1558.
1.01	35.00	48	.01	.00	.01	15.	1.03	1.03	35.00	98	0.00	0.00	0.00	1321.
1.01	36.00	49	.01	.00	.01	12.	1.03	1.03	36.00	99	0.00	0.00	0.00	1118.
1.01	37.00	50	.01	.00	.01	11.	1.03	1.03	37.00	100	0.00	0.00	0.00	943.

SUM 23.91 20.27 3.64 111765.
(607.) (515.) (93.) (3164.83)

CFS
 CMS
 INCHES
 MM
 AC-FT
 THOUS CU M

PEAK
 8601.
 244.

6-HOUR
 6533.
 185.
 13.66
 346.90
 3240.
 3996.

24-HOUR
 2305.
 65.
 19.39
 489.60
 4599.
 5673.

72-HOUR
 1113.
 32.
 19.39
 492.43
 4599.
 5673.

TOTAL VOLUME
 111292.
 3151.
 19.39
 492.43
 4599.
 5673.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 1

4.	4.	3.	3.
3.	3.	2.	2.
2.	2.	2.	2.
2.	2.	2.	2.
50.	21.	32.	44.
12.	30.	21.	17.
12.	10.	25.	15.
36.	127.	23.	28.
53.	183.	24.	30.
488.	674.	1316.	155.
5095.	8203.	8461.	2461.
4376.	2583.	1839.	6112.
			1118.
			943.

CFS
 CMS
 INCHES
 MM
 AC-FT
 THOUS CU M

PEAK
 8601.
 244.

6-HOUR
 6533.
 185.
 13.66
 346.90
 3240.
 3996.

24-HOUR
 2305.
 65.
 19.39
 489.60
 4599.
 5673.

72-HOUR
 1113.
 32.
 19.39
 492.43
 4599.
 5673.

TOTAL VOLUME
 111292.
 3151.
 19.39
 492.43
 4599.
 5673.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 2

3.	3.	3.	3.
2.	2.	2.	2.
2.	1.	1.	1.
2.	15.	24.	40.
37.	22.	16.	11.
9.	12.	19.	22.
28.	95.	183.	267.
348.	405.	694.	1845.
3821.	5330.	6451.	2358.
3282.	1937.	1632.	4584.
		1379.	838.
			707.

CFS
 CMS
 INCHES
 MM
 AC-FT
 THOUS CU M

PEAK
 6451.
 183.

6-HOUR
 4900.
 139.
 10.24
 260.17
 2430.
 2997.

24-HOUR
 1729.
 49.
 14.46
 367.20
 3429.
 4230.

72-HOUR
 935.
 24.
 14.54
 369.32
 3449.
 4254.

TOTAL VOLUME
 83449.
 2364.
 14.54
 369.32
 3449.
 4254.

HYDROGRAPH AT STA 1 FOR PLAN 1, RTIO 3

2.	2.	2.	2.
1.	1.	1.	1.
1.	1.	1.	1.
1.	10.	16.	27.
1.	6.	10.	28.
25.	15.	12.	6.

9818

STATION 2, PLAN 1, RATIO 2
END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW		STOPPAGE	
1.	2.	240.	240.
2.	2.	240.	240.
3.	2.	240.	240.
4.	2.	240.	240.
5.	2.	240.	240.
6.	2.	240.	240.
7.	2.	240.	240.
8.	2.	240.	240.
9.	2.	240.	240.
10.	2.	240.	240.
11.	2.	240.	240.
12.	2.	240.	240.
13.	2.	240.	240.
14.	2.	240.	240.
15.	2.	240.	240.
16.	2.	240.	240.
17.	2.	240.	240.
18.	2.	240.	240.
19.	2.	240.	240.
20.	2.	240.	240.
21.	2.	240.	240.
22.	2.	240.	240.
23.	2.	240.	240.
24.	2.	240.	240.
25.	2.	240.	240.
26.	2.	240.	240.
27.	2.	240.	240.
28.	2.	240.	240.
29.	2.	240.	240.
30.	2.	240.	240.
31.	2.	240.	240.
32.	2.	240.	240.
33.	2.	240.	240.
34.	2.	240.	240.
35.	2.	240.	240.
36.	2.	240.	240.
37.	2.	240.	240.
38.	2.	240.	240.
39.	2.	240.	240.
40.	2.	240.	240.
41.	2.	240.	240.
42.	2.	240.	240.
43.	2.	240.	240.
44.	2.	240.	240.
45.	2.	240.	240.
46.	2.	240.	240.
47.	2.	240.	240.
48.	2.	240.	240.
49.	2.	240.	240.
50.	2.	240.	240.
51.	2.	240.	240.
52.	2.	240.	240.
53.	2.	240.	240.
54.	2.	240.	240.
55.	2.	240.	240.
56.	2.	240.	240.
57.	2.	240.	240.
58.	2.	240.	240.
59.	2.	240.	240.
60.	2.	240.	240.
61.	2.	240.	240.
62.	2.	240.	240.
63.	2.	240.	240.
64.	2.	240.	240.
65.	2.	240.	240.
66.	2.	240.	240.
67.	2.	240.	240.
68.	2.	240.	240.
69.	2.	240.	240.
70.	2.	240.	240.
71.	2.	240.	240.
72.	2.	240.	240.
73.	2.	240.	240.
74.	2.	240.	240.
75.	2.	240.	240.
76.	2.	240.	240.
77.	2.	240.	240.
78.	2.	240.	240.
79.	2.	240.	240.
80.	2.	240.	240.
81.	2.	240.	240.
82.	2.	240.	240.
83.	2.	240.	240.
84.	2.	240.	240.
85.	2.	240.	240.
86.	2.	240.	240.
87.	2.	240.	240.
88.	2.	240.	240.
89.	2.	240.	240.
90.	2.	240.	240.
91.	2.	240.	240.
92.	2.	240.	240.
93.	2.	240.	240.
94.	2.	240.	240.
95.	2.	240.	240.
96.	2.	240.	240.
97.	2.	240.	240.
98.	2.	240.	240.
99.	2.	240.	240.
100.	2.	240.	240.

STAGE		TOTAL VOLUME	
1.	2.	82705.	82705.
2.	2.	2342.	2342.
3.	2.	14.41	14.41
4.	2.	365.95	365.95
5.	2.	3418.	3418.
6.	2.	4216.	4216.
7.	2.		
8.	2.		
9.	2.		
10.	2.		
11.	2.		
12.	2.		
13.	2.		
14.	2.		
15.	2.		
16.	2.		
17.	2.		
18.	2.		
19.	2.		
20.	2.		
21.	2.		
22.	2.		
23.	2.		
24.	2.		
25.	2.		
26.	2.		
27.	2.		
28.	2.		
29.	2.		
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43.	2.		
44.	2.		
45.	2.		
46.	2.		
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69.	2.		
70.	2.		
71.	2.		
72.	2.		
73.	2.		
74.	2.		
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76.	2.		
77.	2.		
78.	2.		
79.	2.		
80.	2.		
81.	2.		
82.	2.		
83.	2.		
84.	2.		
85.	2.		
86.	2.		
87.	2.		
88.	2.		
89.	2.		
90.	2.		
91.	2.		
92.	2.		
93.	2.		
94.	2.		
95.	2.		
96.	2.		
97.	2.		
98.	2.		
99.	2.		
100.	2.		

PEAK OUTFLOW IS		6414. AT TIME 42.50 HOURS	
1.	2.	6414.	182.
2.	2.	182.	182.
3.	2.	182.	182.
4.	2.	182.	182.
5.	2.	182.	182.
6.	2.	182.	182.
7.	2.	182.	182.
8.	2.	182.	182.
9.	2.	182.	182.
10.	2.	182.	182.
11.	2.	182.	182.
12.	2.	182.	182.
13.	2.	182.	182.
14.	2.	182.	182.
15.	2.	182.	182.
16.	2.	182.	182.
17.	2.	182.	182.
18.	2.	182.	182.
19.	2.	182.	182.
20.	2.	182.	182.
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22.	2.	182.	182.
23.	2.	182.	182.
24.	2.	182.	182.
25.	2.	182.	182.
26.	2.	182.	182.
27.	2.	182.	182.
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31.	2.	182.	182.
32.	2.	182.	182.
33.	2.	182.	182.
34.	2.	182.	182.
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37.	2.	182.	182.
38.	2.	182.	182.
39.	2.	182.	182.
40.	2.	182.	182.
41.	2.	182.	182.
42.	2.	182.	182.
43.	2.	182.	182.
44.	2.	182.	182.
45.	2.	182.	182.
46.	2.	182.	182.
47.	2.	182.	182.
48.	2.	182.	182.
49.	2.	182.	182.
50.	2.	182.	182.
51.	2.	182.	182.
52.	2.	182.	182.
53.	2.	182.	182.
54.	2.	182.	182.
55.	2.	182.	182.
56.	2.	182.	182.
57.	2.	182.	182.
58.	2.	182.	182.
59.	2.	182.	182.
60.	2.	182.	182.
61.	2.	182.	182.
62.	2.	182.	182.
63.	2.	182.	182.
64.	2.	182.	182.
65.	2.	182.	182.
66.	2.	182.	182.
67.	2.	182.	182.
68.	2.	182.	182.
69.	2.	182.	182.
70.	2.	182.	182.
71.	2.	182.	182.
72.	2.	182.	182.
73.	2.	182.	182.
74.	2.	182.	182.
75.	2.	182.	182.
76.	2.	182.	182.
77.	2.	182.	182.
78.	2.	182.	182.
79.	2.	182.	182.
80.	2.	182.	182.
81.	2.	182.	182.
82.	2.	182.	182.
83.	2.	182.	182.
84.	2.	182.	182.
85.	2.	182.	182.
86.	2.	182.	182.
87.	2.	182.	182.
88.	2.	182.	182.
89.	2.	182.	182.
90.	2.	182.	182.
91.	2.	182.	182.
92.	2.	182.	182.
93.	2.	182.	182.
94.	2.	182.	182.
95.	2.	182.	182.
96.	2.	182.	182.
97.	2.	182.	182.
98.	2.	182.	182.
99.	2.	182.	182.
100.	2.	182.	182.

STATION 2, PLAN 1, RATIO 3
END-OF-PERIOD HYDROGRAPH ORDINATES

12/21

OUTFLOW							
1.	1.	1.	2.	2.	2.	2.	2.
2.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.
1.	2.	4.	6.	10.	14.	17.	20.
22.	20.	10.	17.	15.	13.	11.	10.
9.	8.	9.	10.	11.	12.	12.	13.
16.	30.	43.	73.	119.	152.	178.	199.
217.	246.	356.	510.	759.	1041.	1364.	1711.
2261.	283.	4271.	4263.	3983.	3588.	3174.	2751.
2976.	4064.	1225.	1027.	868.	735.	623.	526.
1995.	1669.						

STORAGE			
240.	240.	240.	240.
240.	240.	240.	240.
240.	240.	240.	240.
240.	240.	241.	242.
243.	243.	242.	241.
241.	241.	241.	242.
242.	242.	249.	251.
253.	254.	259.	271.
306.	324.	329.	286.
309.	303.	289.	320.
		266.	274.
		263.	270.
		268.	267.
		265.	265.

[illegible]

PEAK OUTFLOW IS 4271. AT TIME 42.50 HOURS

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFS	4271.	3253.	1141.	550.		55046.
CMS	121.	92.	32.	16.		1559.
INCHES		6.80	9.54	9.59		9.59
MM		172.74	242.24	243.56		243.56
AC-FT		1613.	2262.	2275.		2275.
THOUS CU M		1990.	2791.	2806.		2806.

STATION 2, FLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

0.	0.	1.	1.	OUTFLOW
1.	1.	1.	1.	1.
1.	1.	1.	1.	1.
1.	1.	1.	1.	1.
1.	1.	1.	1.	2.
11.	11.	11.	10.	9.
4.	4.	4.	4.	4.

QN(1)	QN(2)	QN(3)	FLAVT	ELMAX	RLNTH	SEL
.0350	-.0350	.0350	476.0	500.0	800.	.01400

CROSS SECTION COORDINATES--STA, ELEV, STA, ELEV--ETC

CROSS SECTION COORDINATES	STABILITY FACTOR	92.00	476.00	98.00	477.00
0.00 500.00	30.00	480.00			
100.00 400.00	170.00	500.00			
STORAGE	0.00	-0.9	.84	1.58	2.70
	10.99	14.72	24.51	28.36	32.38
				4.20	6.09
				36.58	40.96
OUTFLOW	0.00	18.71	401.67	798.82	1489.74
	11994.08	16305.59	26949.21	33254.50	40225.92
				2557.65	4076.39
				47873.72	56209.39
STAGE	476.00	477.26	481.05	482.32	483.58
	488.63	489.89	493.68	494.95	496.21
				484.84	486.11
				497.47	498.74
FLOW	0.00	18.71	401.67	798.82	1489.74
	8732.96	11994.08	26949.21	33254.50	40225.92
				2557.65	4076.39
				47873.72	56209.39
					6113.71
					65245.30

STATION 3, PLAN 1, RTIO 1

[illegible]

STAGE

[illegible]

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6.

MAXIMUM STAGE IS 486.2

STATION 3, PLAN 1, RTIO 4

OUTFLOW

[illegible]

STOP

00000000NM

00000000M

00000000M

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00000000V

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00000000N

STAGE

[illegible]

	PEAK	6-HOUR	24-HOUR	72-HOUR	TOTAL	VOLUME
CFS	2131.	1625.	568.	274.		27419.
CMS	60.	46.	16.	8.		776.
INCHFS		3.40	4.75	4.78		4.78
MM		86.26	120.67	121.32		121.32
AC-FT		806.	1127.	1133.		1133.
THOUS CU M		994.	1390.	1398.		1398.

MAXIMUM STORAGE = 4.

MAXIMUM STAGE IS 484.3

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PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
 AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	PATIO	1	RATIO	2	RATIOS APPLIED TO FLOWS		
								RATIO	3	RATIO 4
					1.00	.75	.50	.25		
HYDROGRAPH AT	1	4.45	1	8601.	6451.	4301.	2150.			
	(11.53)	(243.56)	182.67)	121.78)	60.89)			
ROUTED TO	2	4.45	1	8570.	6414.	4271.	2131.			
	(11.53)	(242.66)	181.62)	120.95)	60.35)			
ROUTED TO	3	4.45	1	8553.	6427.	4276.	2131.			
	(11.53)	(242.19)	181.98)	121.07)	60.35)			

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SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1

ELEVATION
STORAGE
OUTFLOW

INITIAL VALUE
520.00
24C.
0.

SPILLWAY CREST
520.00
24C.
0.

TOP OF DAM
525.25
322.
3324.

RATIO
OF
PMF

MAXIMUM
RESERVOIR
W.S. ELEV

MAXIMUM
DEPTH
OVER DAM

MAXIMUM
STORAGE
AC-FT

MAXIMUM
OUTFLOW
CFS

DURATION
OVER TOP
HOURS

TIME OF
MAX OUTFLOW
HOURS

TIME OF
FAILURE
HOURS

1.00
.75
.50
.25

527.87
526.93
525.85
523.93

2.62
1.6P
.60
0.00

359.
345.
320.
316.

8570.
6414.
4271.
2131.

6.50
5.50
3.00
0.00

42.50
42.50
42.50
43.00

0.00
0.00
0.00
0.00

PLAN 1 STATION 3

RATIO
1.00
.75
.50
.25

MAXIMUM
FLOW, CFS
8553.
6427.
4276.
2131.

MAXIMUM
STAGE, FT
488.5
487.5
486.2
484.3

TIME
HOURS
42.50
42.50
42.50
43.00

187/18

STABILITY ANALYSIS

APPENDIX E

TAMS

Job No. 1579-20

Sheet 1 of 12

Project NYS Dam Inspection

Date 7-27-81

Subject Green Haven Correctional Facility

By JW

Ch'k. by _____

Assumptions:

- 1) Unit Weight of Concrete is 150 pcf
- 2) Ice loads of 5000 lb/ft² acts at spillway crest (COE criterion)
- 3) Friction angle of foundation rock assumed $\phi = 40^\circ$
Cohesion or adhesion assumed $c = 500$ pcf
properties same at abutments
- 4) Dam Site is in Zone 1 - However Based on seismic activity will be addressed as residing in Zone 2 area
- 5) No back fill and minimum settlement on upstream side of dam
- 6) Normal operating level of lake is at EL. 520.0
- 7) Assume grade slope A (see 3 of 14) in case of overtopping

Additional Data: Based on Backwater Flooding Study

Case	Headwater EL.	Tailwater EL.
1/2 PMF	525.85	503.2
1 PMF	527.87	508.5

CASES EVALUATED

CASE I Normal Loading; Lake Level at minimum crest level of spillway EL. 520.0
No Ice Load

CASE II CASE I condition with the addition of assumed ice loading - 1 ft thickness

CASE III Unusual Loading; Lake Level at 1/2 PMF Stage

CASE IV Extreme Loading; Lake Level at PMF Stage

TAMS

Job No. 1579-20 Sheet 2 of 12
Project NYS Dam Inspection Date 7-27-87
Subject Greenhaven Correction Facility Dam By gwl
Ch'k. by _____

Stability Criteria

- a) Overturning - Resultant Force shall be contained within middle $\frac{1}{3}$ of the base for Cases I thru III and within $\frac{1}{4}$ the base
- b) Sliding - Factor of safety against sliding failure shall be 3.0 or greater for Case I thru III and greater than 1.5 for Case II

Sign Convention

- + - resisting moment
- - driving moment

TAMS

Job No. 1579-20

Project NYS Dam Inspection

Subject GACFD

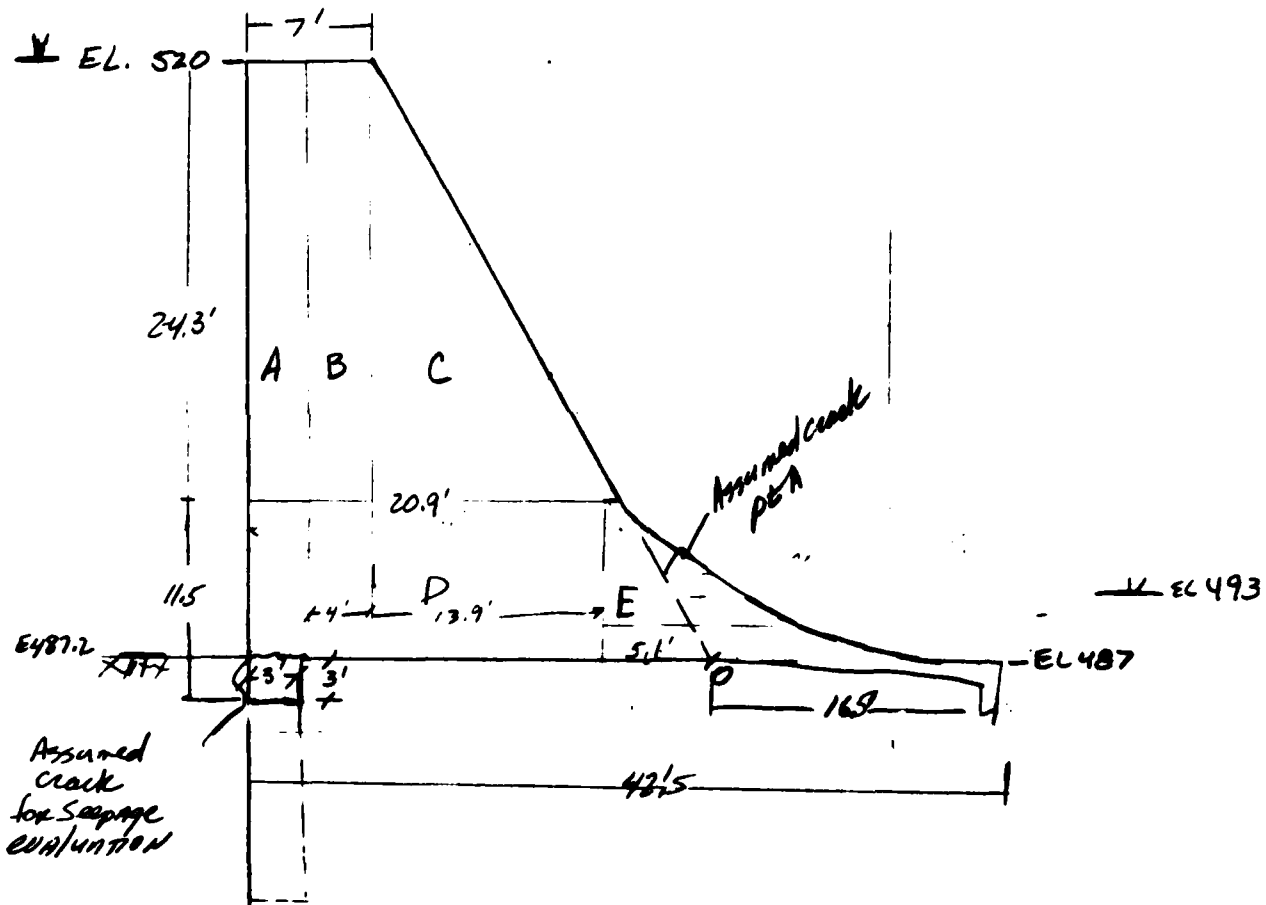
Sheet 2 of 12

Date 7-27-81

By JW

Ch'k. by _____

DESIGN SECTION FROM STATION 0+74 TO 1+24
(Simplified Section)



Calculate Mass of Section

A - $3 \times 35.8 \times .150 = 16.11 \text{ kips}$ $M_{A_0} = 24.5'$

B - $4 \times 32.8 \times .150 = 19.68 \text{ kips}$ $MA_0 = 21.0'$

C- $1/2 \times 24.3 \times 13.9 \times .150 = 25.3 \text{ lbs MA. } 14.4'$

D- $8.5 \times 13.9 \times .150 = 17.72 \text{ Kips}$ $MA_o = 12.0'$

E - $\frac{1}{2} \times 8.5 \times 150 = 3.25$ Kips $M_{A_0} = 3.4$

TAMS

Job No. 15A-20

Project NYS Dam Inspection

Subject GCFD

Sheet 4 of 12

Date 7-27-87

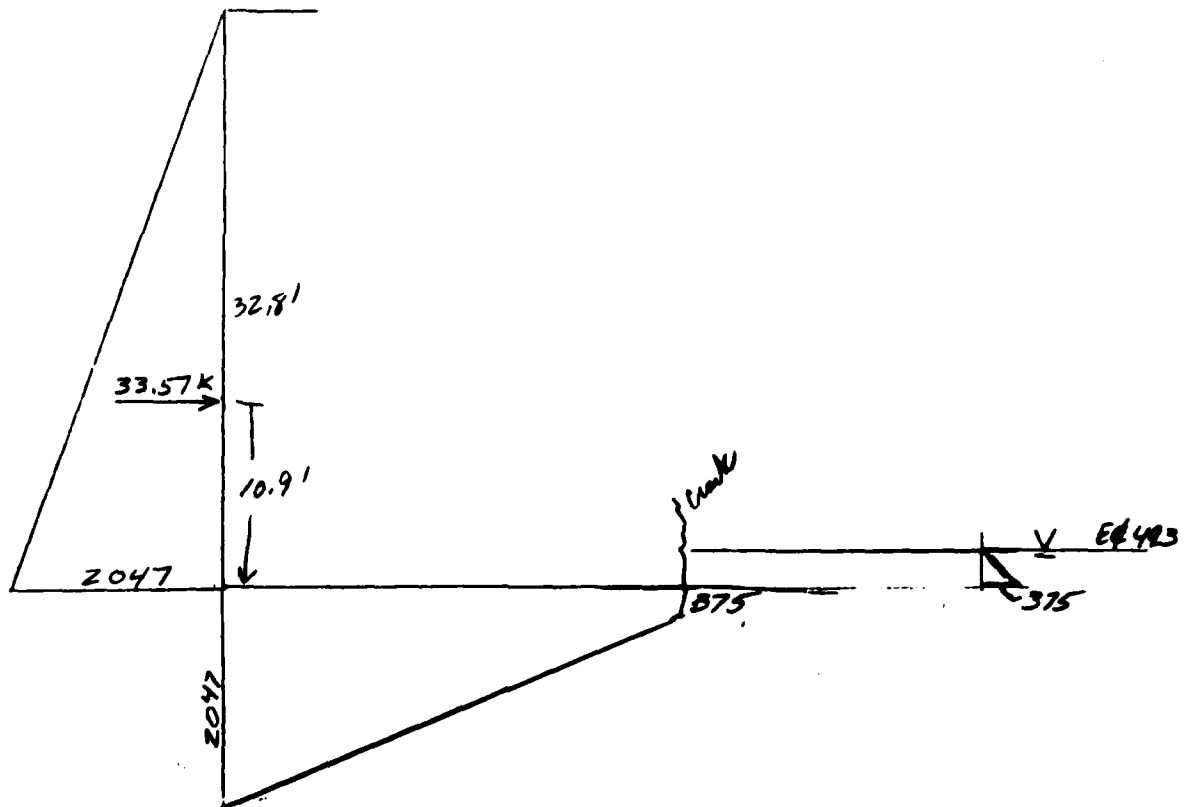
By ju

Ch'k. by _____

$$\sum F_v = 82.04 \text{ Kips}$$

$$\sum M_o = +1396 \text{ K-ft}$$

Hydrostatic Forces Normal Pool



TAMS

Job No. 1579-20

Sheet 5 of 12

Project NYS Dam Inspection

Date 7-27-81

Subject GCFD

By JW

Ch'k. by _____

$$F_{H_1} = 62.4 \times 32.8 \times 1.5 = -33.57 \text{ kips} \quad M_{A_0} = \frac{32.8^2}{8} = 10.9'$$

$$F_{up} = \frac{2047 + 38}{2} \times 260 = 31.5 \text{ kips} \quad M_{A_0} = 17.1'$$

$$M_{A_0} = \frac{31500}{2} - 375 \times \frac{1}{2} (64.3) \times 2$$

$$x^2 + 11.66x - 490 = 0$$

$$x = 17.1$$

$$F_{H_2} = \frac{1}{2} (975) 6 = 1.125 \text{ kips} \quad M_A = -2.0'$$

$$\Sigma F_H = -32.44 \text{ k} \quad \Sigma M_0 = -870.8 \text{ kip-ft}$$

$$\Sigma F_V = -31.5 \text{ kips}$$

Shear Resistance at Cut off / Key

$$0.02 \times 3000 \text{ psi} = 60 \text{ psi}$$

$$Area = 36 \times 12 = 432 \text{ in}^2$$

$$Shear = 432 \times .06 = 25.92 \text{ kips/ft}$$

TAMS

Job No. 1579-20

Project NYS Dam Inspection

Subject GCFD

Sheet 6 of 12

Date 7-27-81

By ju

Ch'k. by _____

CASE II ICE FORCES

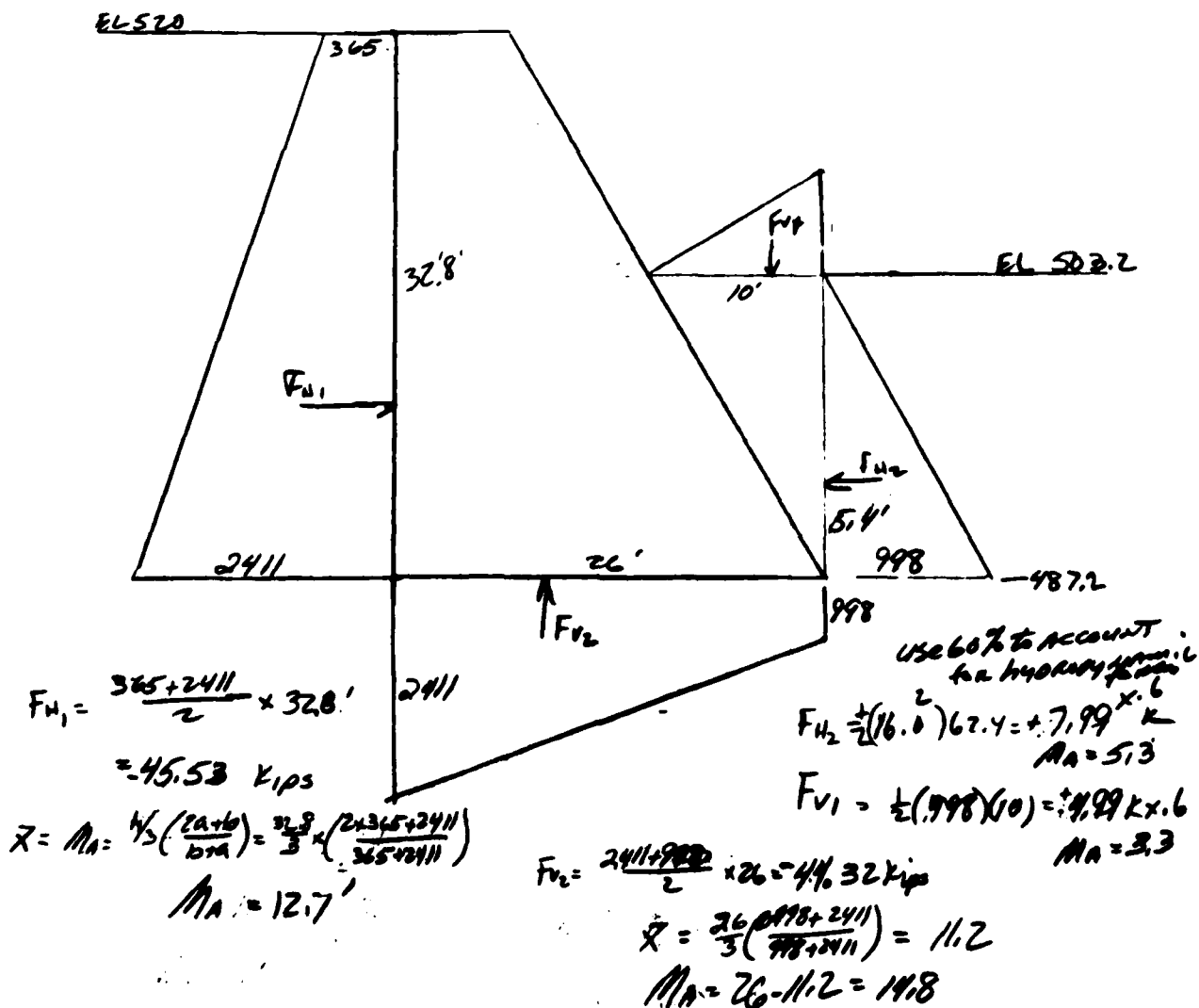
$$F_H = -5000 \text{ lb.}$$

$$M_A = 519.5 - 487.2 = 32.3$$

$$M = 5.0 \times 32.3 = -161.5 \text{ K-ft}$$

CASE III Hydrostatic Forces $\frac{1}{2}$ PMF Case

52585



TAMS

Job No. 1579-20

Project NYS Dam Inspection

Subject GCED

Sheet 7 of 12

Date 7-27-81

By JW

Ch'k. by _____

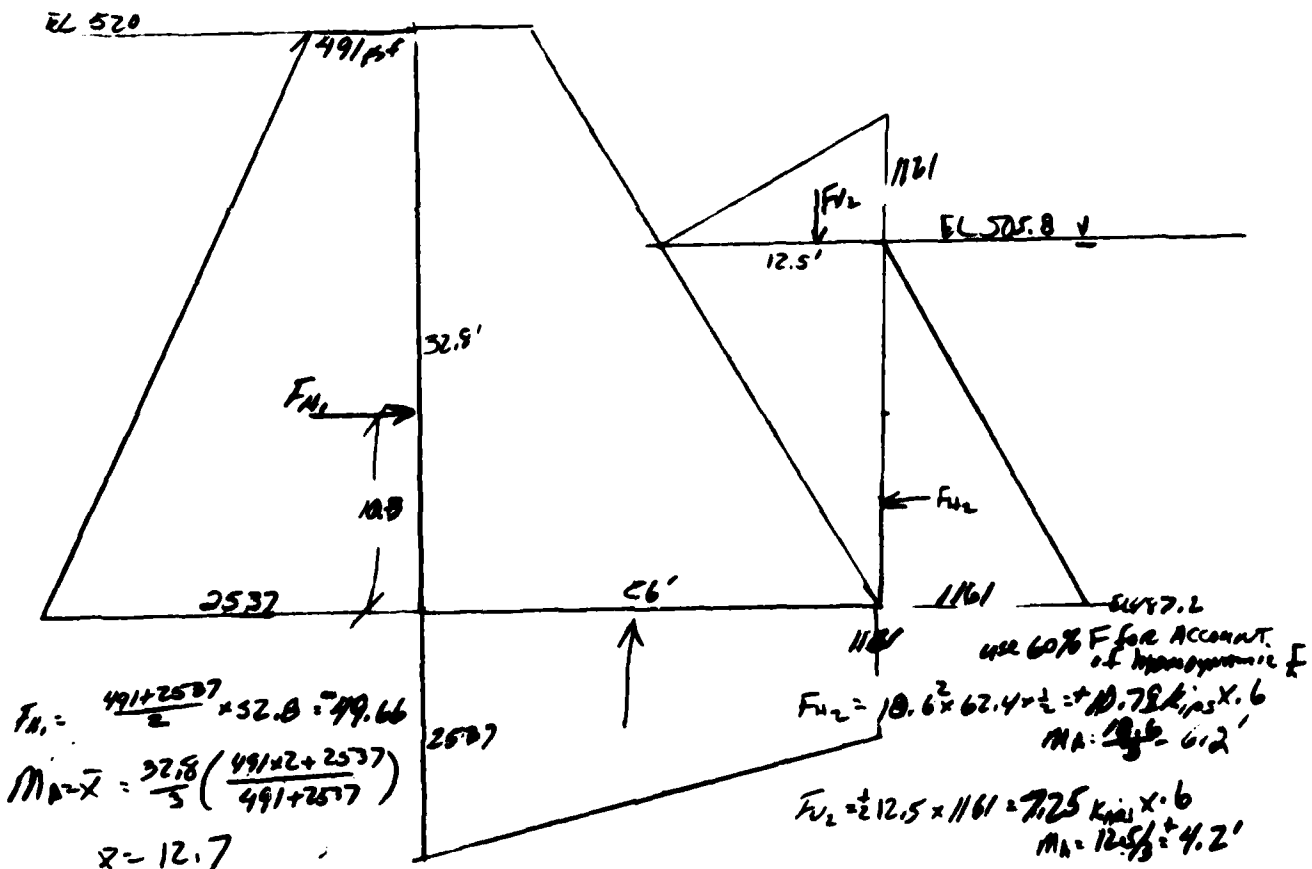
Case III Summary

$$\sum F_H = -40.73 \text{ Kips}$$

$$\sum F_V = -91.32 \text{ Kips}$$

$$\sum M_O = -1199 \text{ K-ft}$$

Case IV Hydrostatic Forces Full PMF
527.82 L



TAMS

Job No. 1579-20

Sheet 8 of 12

Project NYS Dam Inspection

Date 7-22-51

Subject GCFD

By jam

Ch'k. by _____

Case II

$$\Sigma F_H = -43.18 \text{ kips}$$

$$\Sigma F_V = -43.72 \text{ kips}$$

$$\Sigma M_O = -1274.5 \text{ k-ft}$$

Case I

FIND CENTROID of Mass for Dam Section on Pg. 3

Total Mass 82.63 kips $\bar{X}_0 = \frac{1437.3}{82.63} = 17.4'$

FIND \bar{Y} relative to top of Dam

Per unit Mass $\frac{82.63}{2} = 41.32 \text{ kips}$

$$\frac{82.630}{2} = \bar{Y}(3 \times 150) + \bar{Y} \cdot 4 \times 150 + \frac{1}{2}(.572)\bar{Y}^2(150)$$

$$41,315 = 450\bar{Y} + 600\bar{Y} + 42.9\bar{Y}^2$$

$$\bar{Y}^2 + 247\bar{Y} - 963 = 0$$

try $\bar{Y} = 14 \quad -421.2$

$\bar{Y} = 17 \quad -254.1$

$\bar{Y} = 20 \quad -69$

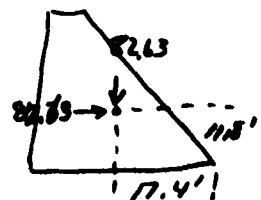
$\bar{Y} = 21 \quad -3.3$

$\bar{Y} = 21.3 \quad 16.8$

$\bar{Y} = 21.1 \quad 5.38$

use $\bar{Y} = 21.0 \text{ ok}$

$MA_0 = 11.9$



TAMS

Job No. 1579-20

Sheet 9 of 12

Project NYS Dam Inspection

Date 7-27-87

Subject GCFD

By Jul

Ch'k. by _____

For Zone 2 Seismic loading use horizontal force
coeff ratios based on 0.05g

1) Dynamic Load

$$\text{Inertial forces} = 82.63 \text{ kips} \times 0.05 = 4.13 \text{ kips}$$

@ center $M_A = 11.8'$

$$M_0 = 48.75 \text{ kft}$$

No backfill \therefore to soil force component

2) Hydrodynamic Load

Zangars Method 32.8' free water
 $\theta = 0$ $C = 0.73$

$$P = 0.73 \times 0.05 \times 0.0624 \times 32.8 = 0.075 \text{ kips}$$

$$P_T = \frac{1}{2} (0.075)(32.8) = 1.225 \text{ kips}$$

$$M_A = 32.8 \times 4 = 13.12$$

$$M_0 = 13.12 \times 1.225 = 16.1 \text{ kft}$$

TAMS

Job No. 1579-20

Sheet 10 of 12

Project NYS Dam Inspection

Date 7-27-81

Subject GCFP

By JW

Ch'k. by _____

Analysis

CASE I - NORMAL LOADING

	F_v	F_H	ΣM_i
Dead Load	82.1 k	-	+1396 kft
Key Stone Resistance	-	+25.92	-
Hydrostatic Forces	-31.5	-32.44	-870.8
	50.6	-6.52	525.2

$$\bar{e} = \frac{26}{2} - \frac{525.2}{50.6} = 2.62$$

$$IS \quad \frac{26}{6} - |2.62| \geq 0 \quad \text{yes (1.78) OK resultant within middle 1/3}$$

F.S. AGAINST SLIDING

$$F.S. \quad \frac{50.6 \tan 40 + 0.5(26.0)}{6.52} = \underline{8.50} > 3 \quad \underline{OK}$$

CASE II - ICE LOADING

	$F_v(kips)$	$F_H(kws)$	$\Sigma M_i(kft)$
Dead Load	82.1	-	+1396
Key Stone Resistance	-	+25.92	-
Hydrostatic Loading	31.5	-32.44	-870
Ice Force	-	-5.0	-161.5
	50.6	-11.52	364.5

$$\bar{e} = \frac{26}{2} - \frac{364.5}{50.6} = 5.79$$

$$IS \quad \frac{26}{6} - |5.79| \geq 0 \quad (-1.46) \quad \text{NO resultant located outside middle 1/3}$$

F.S. AGAINST SLIDING

$$\frac{50.6 \tan 40 + 0.5(26.0)}{11.52} = 4.81 \quad \underline{OK}$$

$$\text{Check Foundation Pressure } P = \frac{50.6}{26} \left(1 \pm \frac{6 \times 5.79}{26} \right) \frac{1000}{144} = 13.5 \pm 18.05 = 31.55 \pm 454 \text{ psi} \quad \underline{OK}$$

TAMS

Job No. 1579-20

Sheet 11 of 12

Project NYS Dam Inspection

Date 7-27-81

Subject GCFD

By JW

Ch'k. by

Case III $\frac{1}{2}$ PMF

	$F_v(k/ft)$	$F_h(k/ft)$	$\Sigma M_o(k/ft)$
DEAD LOAD	82.1	—	+1396
Key shear Resistance		25.92	
Hydrostatic Load	-31.32	-40.73	-1199
	40.77	-14.81	197

$$\bar{e} = \frac{26}{2} - \frac{197}{40.77} = 8.16$$

is $\frac{26}{6} - 8.16 \geq 0$ (-3.83) NO
resultant is outside middle $\frac{1}{3}$

Check FOUNDATION Pressure $P = \frac{40.77}{26} \left(1 \pm \frac{6 \times 8.16}{26} \right) \frac{1000}{144} = 10.89 \pm 20.50 \text{ psi}$
 $= 31.39 \text{ psi} - 9.61 \text{ psi}$

F.S. Against Sliding $\frac{40.77 \tan 40^\circ + 1.5(26)}{14.81} = 3.18 > 3$ OK

Case IV Full PMP

	$F_v(k/ft)$	$F_h(k/ft)$	$\Sigma M_o(k/ft)$
DEAD LOAD	82.1	—	+1396
Key Shear Resistance		25.92	
Hydrostatic Load	-43.72	-43.18	-1274.5
	38.4	-17.26	121.5

$$\bar{e} = \frac{26}{2} - \frac{121.5}{38.4} = 9.83$$

is $\frac{26}{6} - 9.83 \geq 0$ (-5.50) NO
resultant lies outside middle $\frac{1}{3}$

Check FOUNDATION Pressure

$$P = \frac{38.4}{26} \left(1 \pm \frac{6 \times 9.83}{26} \right) \frac{1000}{144} = 10.26 \pm 23.26 \text{ psi} \left\{ \begin{array}{l} 33.52 \text{ psi} \\ -13.0 \text{ psi} \end{array} \right.$$

F.S. Against Sliding

$$F.S. = \frac{38.4 \tan 40^\circ + 1.5(26)}{17.26} = 3.02 > 3 \text{ Acceptable}$$

TAMS

Job No. 157A-20

Sheet 12 of 12

Project 145 Dam Inspection

Date 7-27-81

Subject GCFD

By JW

Ch'k. by _____

Case I - Dynamic Loading

	<u>F_d(Kil)</u>	<u>F_u(Kil)</u>	<u>S.M.(Kil)</u>
End Stem	-	-	-
Dead Load	82.1	-	+1396
Key Shear Resistance	-	25.92	-
Hydrostatic Load	-31.5	-32.44	-870.8
Hydrodynamic Load	-	-4.13	-48.75
Injection Load	-	-1.225	-16.1
	<u>50.6</u>	<u>-11.87</u>	<u>960.35</u>

$$\bar{e} = \frac{26}{2} - \frac{960.35}{50.6} = 3.90$$

$$15 \frac{26}{4} - |3.90| \geq 0 \quad (2.59) \quad \text{yes}$$

resultant is within base

F.S. Against Sliding

$$\frac{50.6 \tan 40 + 0.5(26)}{11.87} = 4.67 > 1.5 \quad \text{OK}$$

SUMMARY

<u>CASE</u>	<u>LOCATION OF RESULTANT</u>	<u>F.S. AGAINST SLIDING</u>	<u>MAX FOUNDATION PRESS</u>
I	WITHIN middle 1/3	8.50	-
II	1.46' outside middle 1/3	4.81	31.55 psi OK
III	3.83' outside middle 1/3	3.18	31.39 psi OK
IV	5.50' outside middle 1/3	3.02	33.52 psi OK
V	WITHIN Base	4.67	-

CRITERIA of Acceptance - Cases I, II, III-IV, Resultant within middle 1/3
 F.S. ≥ 3.0 ; for Case V Resultant must be within
 Base F.S. ≥ 1.5

REFERENCES

APPENDIX F

REFERENCES

1. "Flood Hydrograph Package (HEC-1) Users Manual for Dam Safety Investigations", U. S. Army Corps of Engineers, Hydrologic Engineering Center, September 1979.
2. "Seasonal Variation of the Probable Maximum Precipitation, East of the 105th Meridian for Areas from 10 to 1,000 Square Miles, and Durations of 6, 12, 24 and 48 Hours", Hydrometeorological Report No. 33. Weather Bureau, U.S. Department of Commerce, April 1956.
3. "Recommended Guidelines for Safety Inspection of Dams", Department of the Army, Office of the Chief of Engineers, Appendix B.
4. The University of the State of New York, The State Education Department State Museum and Science Service Geological Survey - MAP and Chart Series No. 5, Geologic MAP of New York 1961, Lower Hudson Sheet.

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